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RAILWAY LOCOMOTIVES AND CARS

JUNE 1953

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JUNE, 1953

VOLUME 127

No. 6

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal.

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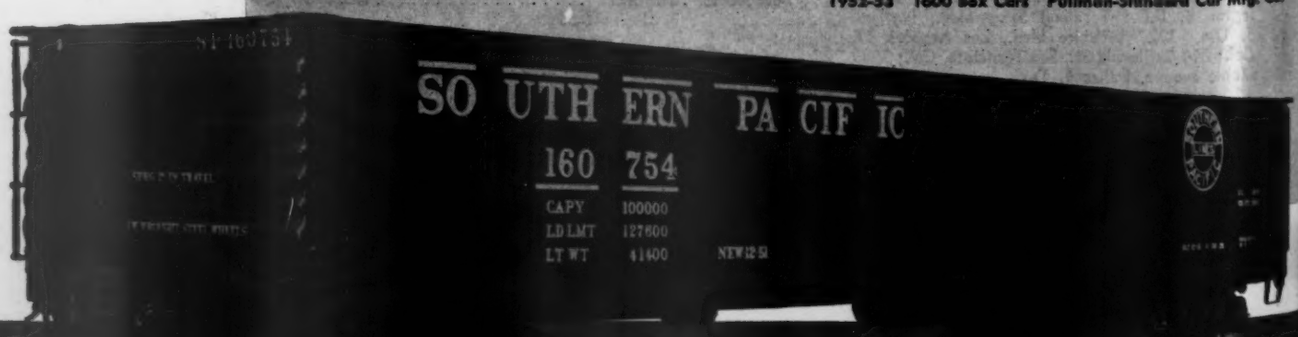

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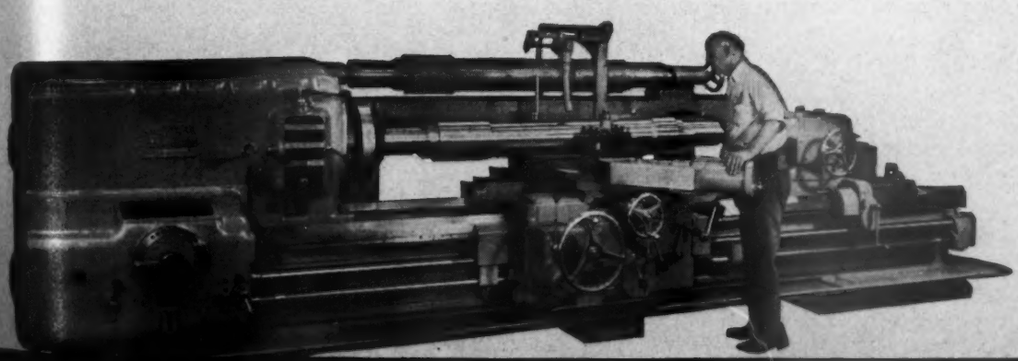

Bulletin No. 35 gives a complete description and shows many examples. It's yours for the asking.

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THE BIG SHOW

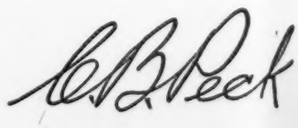
The Mechanical Division of the Association of American Railroads and its two predecessor organizations—the Master Car Builders' Association and the American Railway Master Mechanics' Association—have played a major part in the development, improvement and standardization of railway motive power and rolling stock for the past 86 and 85 years, respectively. From an early date the meetings of the predecessor organizations were accompanied by exhibits of details of design, patented devices and parts for cars and locomotives, and by 1906 the demands for exhibit space had grown to such an extent that adequate accommodations were hard to find. This led to the move to Atlantic City, first to the Steel Pier, then to Youngs Million Dollar Pier and, finally, to the great Convention Hall.

These meetings of the members of the railroad organizations, where was assembled the actual products of the companies catering to the needs of the railroads, have been an important factor in hastening the crystallization of opinion with respect to many important developments in this field. A few examples are the adoption of the vertical-plane coupler and the later evolution of the Type D and the Type E couplers; the work preceding the adoption of the Westinghouse air brake as standard; the evolution of requisites for draft gears and bringing cast-steel freight-car truck side frames and bolsters to their present state of reliability.

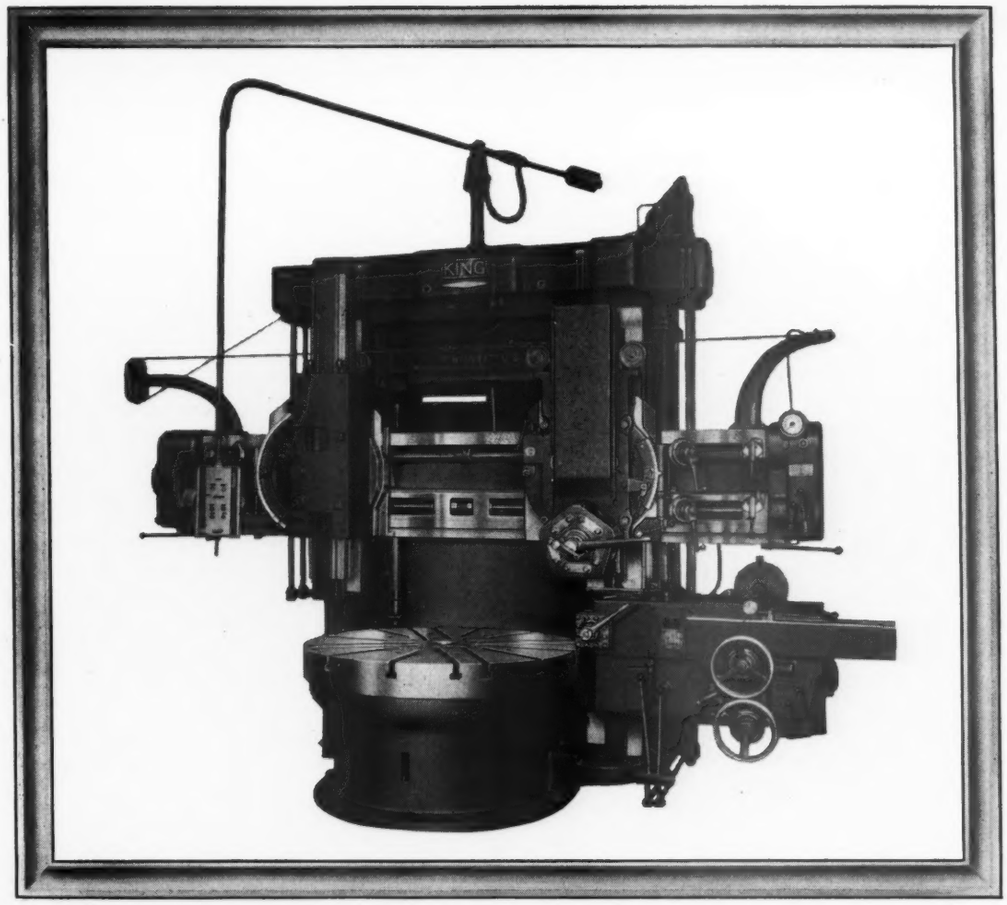
In an industry as old as the railroads, particularly one which depends upon interchangeability of equipment as they do, the area within which the designer and inventor has a free hand has been very much narrowed. Departure from basic designs becomes extremely difficult. The result is that the crop of new designs of cars and their parts is small and usually confined to perfection of details. The job has become more one of engineering and less one of invention. In the matter of motive power, with the advent of the diesel-electric locomotive, the development and improvement of which is in the hands of the builders, the same narrowing of the function of the large exhibit has taken place.

After six years an exhibit of the Railway Supply Manufacturers' Association will be held at Atlantic City during the meetings of the Mechanical and Purchases and Stores Divisions on June 22 to 26, inclusive. During the week the Electrical Sections of the A.A.R. will also meet there, and member meetings of the A.A.R. and the American Short Line Railroad Association will be held. Delegates to the Eighth Pan American Railway Congress will also be present at Atlantic City during the week.

This promises a much broader range of attendance than is usual at the Atlantic City exhibits. The success of the exhibit, from the standpoint of the exhibitors, however, will not depend upon the number of American railway executives and Pan American delegates who will visit them. It will depend upon the number of departmental officers and supervisors visiting Atlantic City during that week who share the responsibility for recommending, specifying, purchasing and getting performance out of the many kinds of equipment and devices which will be on display.



A BASIC "PART OF THE PICTURE" IN MODERN LOCOMOTIVE MAINTENANCE



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EDITORIALS

While There Is Still Time

Sometime within the next few years the railroads may cross a dangerous threshold (from an economic standpoint) as far as motive power maintenance is concerned. Maintenance methods and maintenance facilities have taken shape rapidly and in the process of evolution from the relatively recent days of the first diesel-electric installation many changes have already been made.

As a general proposition a wide difference of opinion might seem to exist between manufacturers and the railroads as to whether the roads should buy repair parts on the outside or set up their own facilities for repair and reclamation. The mention of this controversial question immediately reminds us that it is not a new question but one which has been discussed over and over for many years during the days of the steam locomotive.

It is a fundamental principle that the primary function of a railroad is to furnish transportation, to maintain adequate facilities to meet any foreseeable demands for transportation and to insure the continuity of this service. Therefore, in good times and bad, in peace time and in war time, the railroads, by force of necessity, must always be prepared to be self-sufficient in the matter of continuing transportation service regardless of conditions in an industrial market upon which they have to rely for materials and parts.

This matter of the economies of motive-power maintenance is a broad one and an important one. It is going to require accurate and comprehensive exploration of the whole question of whether the railroads should buy or repair, and to what extent. Anyone who has been connected with the railroad industry for 15 or 20 years can call to mind many examples of what seemed to be economical reclamation operations in which the savings appeared to be so attractive that they decided to go into the job on a large scale. Therein lies the danger. Jobs which are byproducts in small quantity, incurring no additional expense for facilities or supervision, become much more expensive when expanded beyond the capability of current facilities and supervision. There is a boundary somewhere beyond which the railroads should not spend money for the installation of facilities or the building up of an organization to perform certain types of operations which may only result in providing an inferior replacement part at a price which is too high. Back in the steam-locomotive days millions of dollars were spent and extensive shops were built to do jobs of this kind. Being mindful, again, that the diesel-electric locomotive is "a horse of another color" as compared with the steam locomotive, a concluding reminder might be — don't build any "white elephants."

Roundhouses Can Still Be Useful

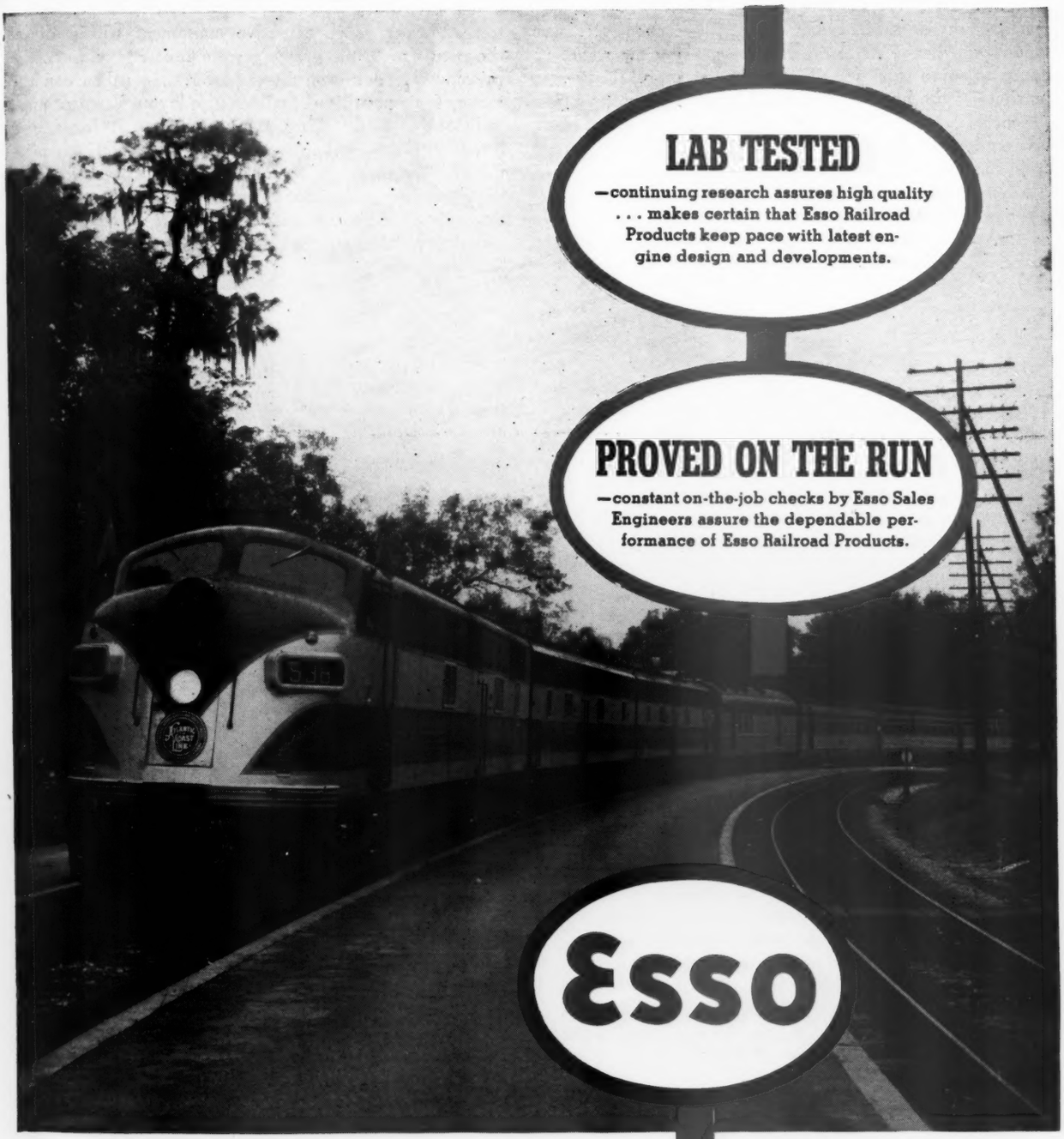
With the steam locomotive going or gone at most maintenance points, and diesel shops either being built new or converted from former back shops, there is a natural tendency to tear down existing roundhouses at the first opportunity. This obviously makes good sense when the structure is old and unduly expensive to maintain.

But is this necessarily the wise course when the house can be put to use? It is true of course that the space is not in anywhere near the ideal form, and that there are often other disadvantages—too far from the main shop, poor lighting, lack of good runways for access, etc. But with a little ingenuity most of the effect of these handicaps can be overcome, and at a cost per usable square foot of space much less than in a new structure.

And is it a good bet to retain a roundhouse adjacent to a diesel shop where there is no immediate need for the space but where there might be in the future? It would seem so because nearly every diesel shop built to date has turned out to be too small within a short time after it is built, if not by the time it was completed—some because the diesel fleet grew more than expected, others because the shop took on maintenance work not originally contemplated, most from a combination of these reasons.

Roundhouses are not too bad a place to service switchers if doing this work in the main shop causes congestion. Multiple-unit road locomotives can be handled in stalls that line up directly with the lead tracks as several units can be brought over even short turntables without being separated. Quite often the stalls themselves are long enough, having been lengthened to accommodate steam locomotives with long tenders. And, speaking of turntables, is it any cheaper to build and maintain a wye than to continue a turntable where it is desirable or necessary to turn power?

Aside from servicing, roundhouses can be put to a variety of uses in which the shape is not a serious disadvantage. Sections of the building can be set aside for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machine shops, sheet metal shops, forge shops, truck repairs and heavy electrical overhauls, using the roundhouse as a job shop for the main diesel shop. Unused portions of the house can be used by other departments for such work as maintaining mechanized track and roadway equipment, thus reducing the charges to diesel repairs from heating and maintaining the structure.

There will of course be certain disadvantages to using a roundhouse in any way to meet present or future maintenance requirements as the space will no be in the ideal shape. But there is an increasing need for, as well as a trend toward, more extensive equipment within diesel shops to handle the growing volume of heavy work the railroads are doing on diesel power. How then can the money for a new diesel maintenance layout be spent most judiciously—by marking a big chunk of it for a new building, and what happens to be left for interior equipment? Or would it be better to accept a few minor disadvantages and adapt an existing roundhouse, using the saving in building costs to buy more and better shop machinery, cleaning equipment and material-handling facilities?

Trading Speed for Heat

With diesels, like everything else, you usually get what you pay for. Sometimes you pay for what you get—and that usually means you paid too much.

Probably everyone who has attended diesel school has been given the problem about the two trains of equal tonnage hauled by two locomotives which are identical except for the gear ratios between the traction motors and the driving wheels. Both trains are to run perhaps 70 miles on level tangent track. One is geared for perhaps 65 miles an hour, and the other 80 miles an hour. The question is which one will reach its destination first.

Most of the students are inclined to guess that it will be one or the other. A little attention to the facts will show that both locomotives will run above the minimum and below the maximum permissible speeds. Then, since the two locomotives have the same horsepower, the two trains will arrive at their destination at the same time—you get out what you put in and nothing more.

Why, then, the two gear ratios. Obviously, one is designed to haul a heavier train at slower speeds and the other a lighter train at higher speeds, but diesel-electric locomotives have much flexibility and may be operated over a considerable range of loads and speeds. When they go fast, you exchange amperes for volts. When they go slow, you exchange volts for amperes, but the product of volts times amperes, which is power, remains the same.

Heat in the motors is caused by amperes, in fact it is proportional to the square of the current measured in amperes. For this reason, a locomotive must not run too slowly for too long a time. To get away from this a higher gear ratio may be used so the motors will run faster.

It is a known fact that if motors run too fast they will be damaged mechanically. They may even burst their bands and throw their coils, but this will not ordinarily happen until their speed is far in excess of specified limits.

More recent knowledge, gained from hard experience indicates, for example, that if a locomotive with a 100-mile gear ratio is run for long periods of time at 100 m.p.h., trouble is almost certain to follow. The fine glossy chocolate brown surface of the commutator disappears and an epidemic of flashovers is almost sure to follow. Getting away from the heat is good, but apparently even worse trouble can be caused by operating continuously at high speeds, even though they are within assigned limits. Trading speed for heat is good, but it is becoming evident that more damage may be caused by squeezing the upper speed limit than the lower.

NEW BOOKS

TRANE AIR CONDITIONING MANUAL. *Published by the Trane Company, La Crosse, Wis. 380 pages, 9 in. by 11½ in., illustrated. Price, $5.*

This manual is an outgrowth of material originally prepared for the Trane Company and used in loose-leaf form for some time. It is concerned primarily with the application of the fundamental facts of engineering to the design of air-conditioning systems. No attempt has been made to derive the various formulas and methods by strictly matemathical means. In most cases, fundamental ideas have been developed from their physical basis. The book begins with a simplified presentation of the basic physical laws governing heat and cold and applies these laws to practical problems in air conditioning. A chapter on comfort and physiology of human heat control mechanism illustrates comfort standards. Other chapters on heat gain and loss, properties of air and the psychrometric chart, refrigeration and calculations for the conditioned air supply are among those given on basic air-conditioning system design and equipment application. Problems at the end of each chapter show practical applications. Answers are found in a separate section. In the reference section are standard tables on air, refrigerants, pipe capacities for refrigerant liquid and vapor and ducts. A fan chapter has also been added and is available separately for $1.

Army Road Switchers Present Unusual Design Problems

BY ALEXANDER ROSS
and
R. J. MARTIN

THE rigid specifications set by the U. S. Army for the 83 new military-type road switchers now being delivered by American Locomotive and General Electric companies presented many unusual design problems.

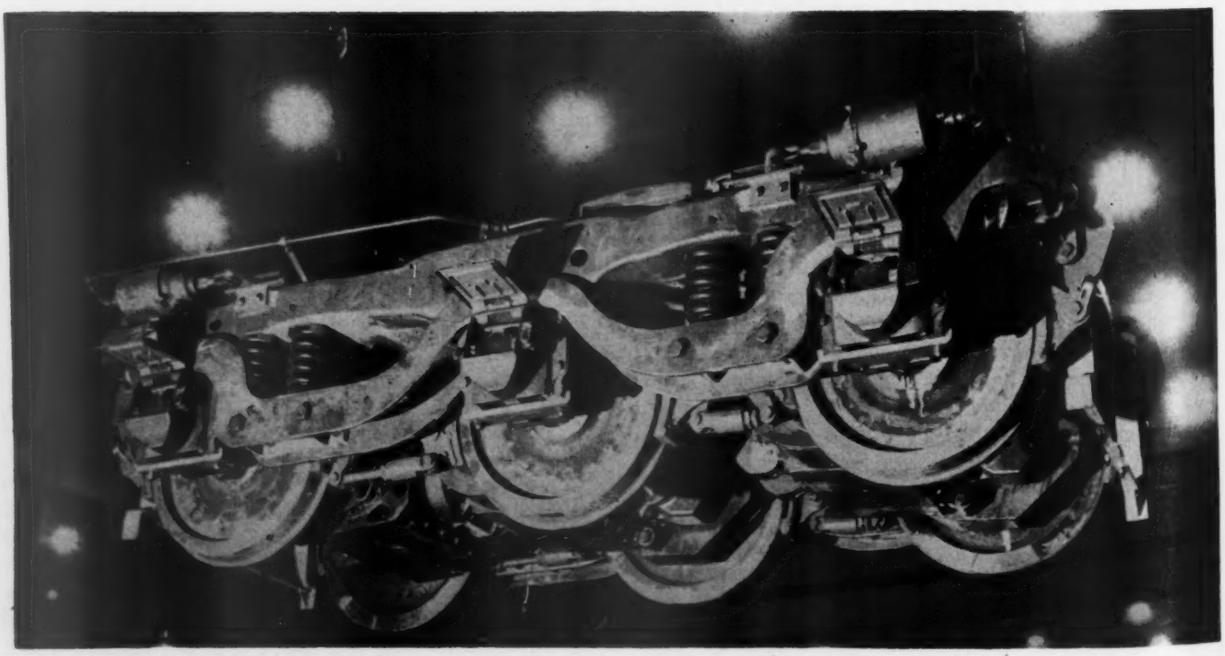
The Army required a 1600-hp locomotive capable of operation in road and switching service on nearly any wide gage track in any climate in the world. The unit furnished is basically the standard 1600-hp Alco-GE road switcher, modified as described in this article. The over-all locomotive weight had to be held to 120 tons—the weight of the standard Alco-GE unit, despite the addition of extra equipment. This equipment included 3-motor instead of 2-motor trucks, an extra fuel tank and several winterization items.

Mr. Ross is chief engineer, American Locomotive Company, Schenectady, N. Y. and Mr. Martin is with the Locomotive & Car Equipment Department, General Electric Company, Erie, Pa.

Draft gear had to be arranged so that couplers of both U. S. and foreign types could be fitted quickly. The Army specifications also called for restrictions in height and width, and provision for multiple-unit operation with diesel locomotives of other makes possessed by the Army Transportation Corps.

The primary design problem was presented by the low locomotive weight requirement. The locomotive could weigh no more than 120 tons, but must include 6-wheel, 3-motor trucks, 800 additional gallons of fuel, and two to

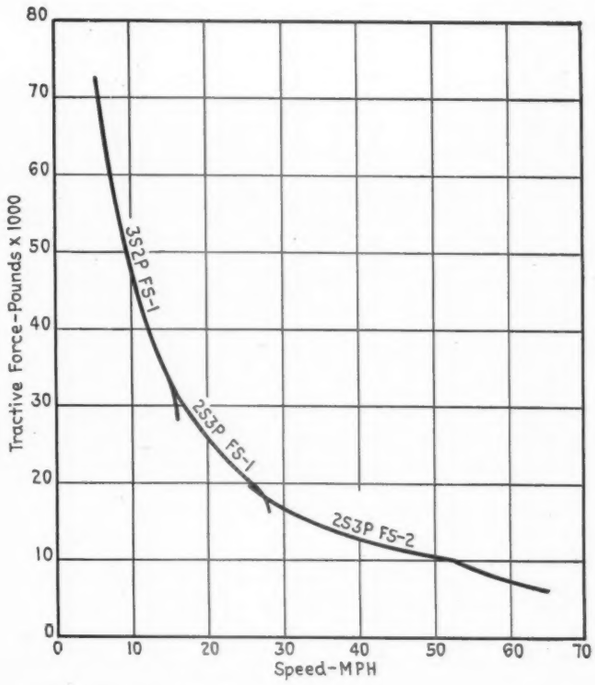
Wheeling the locomotive.



The six-wheel trucks are equipped with clasp brakes.

PRINCIPAL CHARACTERISTICS OF THE 1,600-HP DIESEL-ELECTRIC ROAD SWITCHER

Type	A. A. R. (C-C) Common (0-6-6-0)
Road numbers	U. S. A. B-2041 through U. S. A. B-2090 and U. S. A. 2091 through U. S A. 2123
Maximum weight, tons	120
Maximum weight, with steam generator applied, tons	123
Truck rigid wheel base, ft.-in.	11–4
Total locomotive wheel base, ft.-in.	41–2
Length over floor frame, ft.-in.	52–6
Length at coupling line, Willison couplers, ft.-in.	56–9¼
Width over cab sheeting	9–4
Width over handrails	9–6
Height over roof walkway, ft.-in.	13–3½
Maximum height, ft.-in.	13–5
Driving motors	6
Driving wheels, pairs	6
Diameter wheels, in.	40
Gear ratio	65/16
Fuel, gals.	1,600
Fuel, with steam generator, gals.	800
Steam generator water, when applied, gals.	800
Sand, cu. ft.	28
Cooling water, gals.	205
Lubricating oil, gals.	200
Input to generator for traction, hp	1,600
Maximum speed, m.p.h.	65
Curvature (with or without train)	30 deg. (193 ft.)
Continuous tractive force, lb.	45,000
Tractive force at 30 per cent adhesion, lb. (approx.).	72,000
Horsepower for traction, hp	1,640
Weight fully loaded, lb.	233,170
Weight light, lb.	215,170



Speed-tractive-force curve.

three heaters for warm-up of engine at sub-zero temperatures. Piping and other parts for future application of vacuum brakes had to be provided.

It was essential that the weight per axle be kept low because rails, bridges and other structures in foreign countries generally will not support the heavy weights permissible in the United States. At the same time, the Army needed locomotives that would have the basic performance characteristics of American types in respect to speed and pulling power.

The standard apparatus on the locomotive—engine, generator, compressor, brake rigging and electrical equipment—offered no possibility of weight reduction. It was necessary to obtain all weight saving in the floor frame, cab and hood structure, and trucks.

A frame section deeper than standard utilizing a lighter but deeper sill was designed. This resulted in a considerable weight saving without sacrificing strength or rigidity.

The high floor, caused by the deep frame section, coupled with the low and narrow building limits specified by the Transportation Corps compelled a reduction in cab and hood heights and in cab width. This, in turn, actually helped to solve the problem of weight reduction in these parts.

Reduction of truck weight was made possible by the use of lighten traction motors, matched to the lower adhesive weight at the wheels, and also by efficient use of materials. The truck design utilized three-point loading, with a conventional center plate and two loading pads, thus eliminating the need for a heavy bolster section.

The Army specified that differences in rail loads between the two trucks should not exceed one per cent of the total locomotive weight. This introduced difficulties in the design because of the number of combinations of apparatus arrangement required to meet varied operating conditions. A steam generator, with its 800 gallons of water; a vacuum exhauster; and a winterization kit, with heaters for the engine and batteries, might be applied singly or in combinations. The item tending to disturb truck loadings to the greatest degree was the steam generator. It was located near the rear of the locomotive. This results in higher loadings on the rear truck than on the front truck when the steam generator is installed. Full advantage was taken of the small unbalance allowed by having more weight on the rear truck when the steam generator is applied and on the front truck when the steam generator is omitted.

Truck Design Adapted from Standard Three-Motor Model

Equal axle loading, to insure against wheel slippage, is particularly important in the design of six-wheel, three-motor trucks. A flexible system of equalization is required to provide smooth riding over irregular track. This is not possible in a truck entirely dependent on spring deflection.

A basically suitable truck has been in use of Alco-GE six-motor road switchers since early 1951. It is designed for ease of maintenance, equal weight distribution and smooth riding at high speeds. The truck for the Army locomotives is of the same basic design.

The drop equalizer truck used here is a departure from the usual swivel type. A center plate offset from the exast truck center, is used as the pivot point; but it carries only a portion of the load on the truck—the two loading pads support the remainder. This results in equal axle loading despite changes in load on the truck. The loading pads are fixed to the locomotive underframe and slide on load-carrying plates located on the truck frame. Both center plate and loading pads operate in oil baths.

The spring system of the truck consists of four groups of helical springs, each located near an end pedestal. The truck frame is supported on these springs which, in turn, are carried on four sets of double, drop-center equalizers extending from the end axles to the center axle. The desired equal axle loadings are attained by proper positioning of these springs along the spans of the equal-

The controls at the operator's position.

izers and by proper proportioning of the springs. Friction type snubbers are applied in one spring of each group. The arrangement of long equalizers and deep-deflection springs contributes to smooth riding at high speeds.

The center plate of the truck is located on a cross transom between the two axles toward the end of the locomotive. The loading-pad bearings are located on the other transom toward the center of the locomotive. By placing the load-carrying members between motors, advantage is taken of the deep transom sections to transmit the load to the side frames.

The truck is designed so that the center motor is fully accessible for all inspection and servicing. Adequate working space within the truck frame at both ends of the center motor is provided. In addition, brake shoes may be replaced without having to put the locomotive over a maintenance pit.

The use of an axle with a long wheel fit allows the wheels to be moved on the axles to permit the locomotives to be operated on track gages of 56½, 60, 63 and 66 in. All brake fulcrum pieces, normally integral with the truck frame, were made as separate units. These are bolted to the frame with bolt holes drilled at intervals depending on the spacing required.

Traction Motors Modified Slightly

Six type GE-731 traction motors drive the locomotive axles through single reduction spur gearing. These motors are essentially the same as the standard used in Alco-GE switchers. With these motors, using 65:16 gearing, the locomotives meet the Army specifications for a continuous rated tractive effort of 45,000 lb. at 10 mph. Their maximum tractive effort rating of 72,000 lb. is equivalent to 30 per cent adhesion with a locomotive weight of 239,000 lb.

A General Electric Type GT-581 d-c traction generator, direct-connected to a standard Alco 1600-hp engine, furnishes power to the traction motors. A GY-27 auxiliary generator and type AM-808 amplidyne exciter are mounted on and gear-driven from the main generator. The auxiliary generator supplies power for battery charging, lighting and control circuits; the amplidyne supplies excitation for the main generator.

General Electric electro-pneumatic type control equipment is installed on the locomotives. This equipment consists basically of a master controller, a reverser, contactors, relays and switches, which set up the proper electric circuits for locomotive operation, either singly or in multiple unit. Three traction motor connections are provided in order to utilize full engine horsepower over nearly the entire locomotive speed range from 0 to 65 mph. There are three motors in series, two groups in parallel, full field strength; two motors in series, three groups in parallel, full field strength; and two motors in series, three groups in parallel, reduced field strength. Transition of motor connections is controlled automatically in response to speed, both when accelerating and decelerating. Supervisory control can, however, be imposed to limit operation to the first motor connection.

Locomotives Operate in All Climates

The locomotives have built-in characteristics which will permit operation in temperatures ranging from —40 deg. F to 125 deg. F, with provision for operation in temperatures as low as —65 deg. F.

Increased radiator capacity and increased air flow through radiators allow engine operation at ambient temperatures of 125 deg. F without exceeding the normal engine temperature at full load of 190 deg. F.

Low temperature operation posed several problems; battery output would be redcced; fcel would not flow freely and combustion would be impossible; also, lubricating oil would thicken to the point of preventing engine cranking.

Two oil-fired, hot-water type heaters of 150,000 BTU per hour output were installed to permit warm-up and operation of the locomotive at —40 deg. F. A third heater can be applied for operation at the lowest limit. All heaters are located in the rear of the hood back of the cab.

The first heater warms the fuel system and the batteries. A circulating pump on the heater forces the heating fluid through coils around battery box, fuel tank and piping on the engine and the locomotive chassis.

The second heater warms and circulates engine coolant through the engine cooling system. The coolant by-passes the radiators through a thermostatically-controlled valve until the engine temperature has risen sufficiently. This heater also warms the engine intake filter box.

The third heater, if installed, provides additional heating for the fuel and cooling systems when the temperature drops below —40 deg. F.

Fuel oil for these heaters is stored in a small tank. Battery-powered electric heaters are employed to warm this tank and fuel, and to heat the circulating pumps before the oil-burning heaters are started. When the first main heater is ignited, its exhaust is channeled around the fuel tank. This keeps the use of electric heaters to a minimum, thus cutting the drain on the battery.

Mechanical arrangements also contribute to quick engine starting and locomotivve operation in cold weather. Shutters are provided in the top of the engine hood and are interconnected with the engine lubricating oil pressure lines so that they open automatically to allow a flow of air into the engine when it is started. Engine air filter intake openings for cold weather operation are located within the engine compartment. Air is drawn into the

filter through the roof shutters and is partially warmed by the engine and exhaust manifold. The entire engine hood is closed, louvers on hood doors are covered and insulation is applied wherever practicable.

Air flow through the radiators is regulated by thermostatically-controlled shutters at both intake and outlet points. In addition, radiator fan speed is controlled in accordance with temperatures by an electric clutch of the eddy current type.

Steam generators for train heating are installed on fifty of these locomotives. This generator has a capacity of 2,750 lb. of steam per hour and is provided with an 800-gal. water tank. When the steam generator is applied, the locomotive fule oil capacity is cu tfrom 1,600 gal. to 800 gal.

Designed for Different Types of Couplers

The locomotive draft gear is so designed that it can be fitted easily with couplers of any U. S. Standard or foreign type used in the world. This feature was made possible by applying a draft gear housing that would permit the use of a reversible coupler support and a movable coupler stop block. Thus coupler heights can vary between 34½ in. and 41 in. without requiring the replacement of any parts.

Provision was also made for varying the transverse centers of spring buffers when these are applied in combination with foreign couplers.

Locomotive Specifications

The locomotive is 56½ ft. long, 13½ ft. high and 9½ ft. wide. Its total weight is 233,000 lb. without the steam generator and 239,000 lb. with it. Top speed with gear ratio of 65:16 is 65 mph. The diesel engine is the Alco Model 244, Vee type, 12-cylinder, rated at 1600-hp. The main generator is Type GT-581, the standard on Alco-GE road-freight locomotives.

A Highly Versatile Unit

With a minimum of alteration, this locomotive is readily adaptable to changes of track gage, climates, couplers or type of service. It is capable of operating in multiple either with identical units or with other Transportation Corps locomotives designed to the same specifications. Based on established design, it is equipped with a power plant, motors, control and trucks of standard production and proved performance. These factors all contribute toward the reliable operation and economical maintenance so necessary for a locomotive operating under such varying conditions.

■ ■ ■

Adjustable, counterweighted platforms used in program car repairs at the Sacramento, Cal., shops of the Southern Pacific.

1. First conversion step is to break the bolts with a chipping hammer, then kick in the old sides, salvaging the lumber for re-use.

How the Frisco Is Making Steel Grain Cars from Wood Box Cars

2. After the car sides are removed, the deck bolts are knocked out, again using a pneumatic chipping hammer.

THE Frisco has inaugurated a car reconditioning program at its shops at Springfield, Mo., in which 600 box cars will be converted from wooden to all-steel construction by the end of this year. An average of 50 cars a month are being turned out on an assembly line basis by the 45 men employed in the operation. The bulk of the cars being reconditioned are 50-ton cars in the 161500 series purchased in 1930. With the sides completely replaced and the balance of the car reconditioned, the railroad is getting virtually the equivalent of a new car.

Under the procedure being used the cars are first placed on a stripping track where all wooden sides and

3. With the wooden sides and flooring removed, galvanized iron roofing is burned free with an acetylene torch.

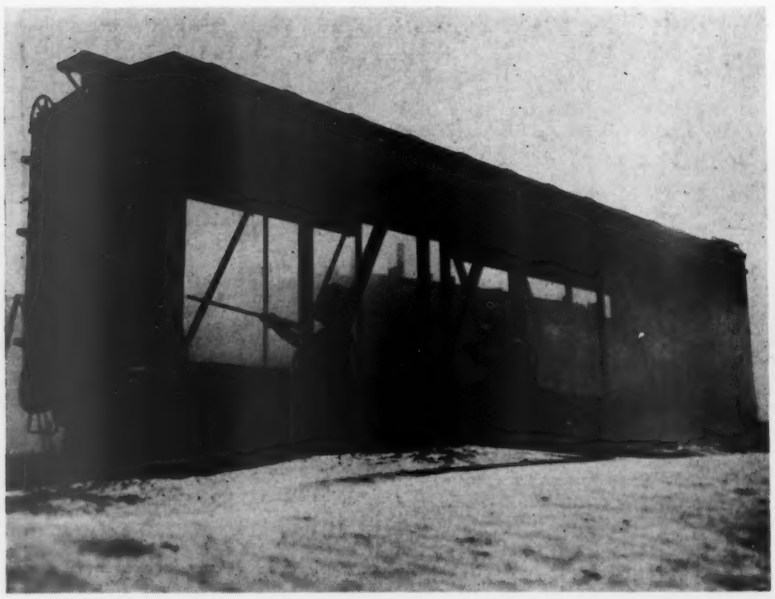
4. Damaged car ends are straightened with a pull jack after heating the dented portions with a torch.

5. All defective steel parts are removed and replacements are riveted to the frame in a subsequent operation.

6. Holes for fastening down deck straps are drilled in the spot where all drilling and steel fitup work is done.

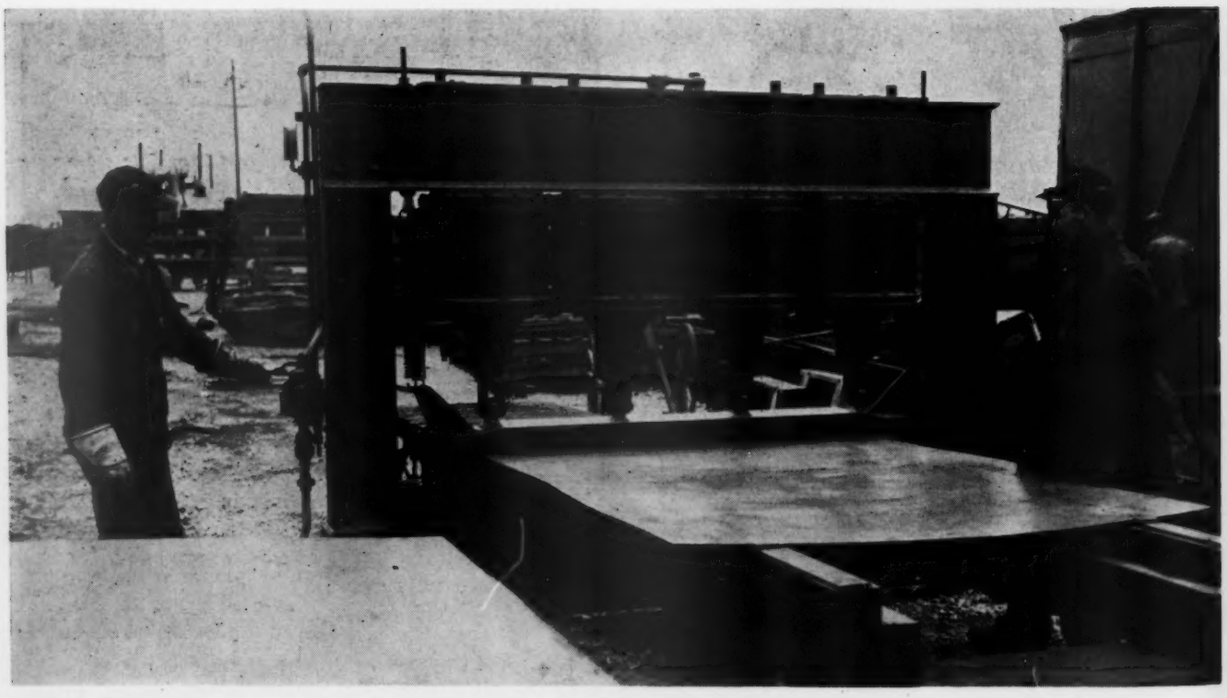
floors are removed. The cars then move on to a second position where roof starter sheets are taken off if roof repairs are required, and the steel ends of the cars are straightened.

In the next position all defective steel parts are removed and replaced. With the frame completely rehabilitated and the reconditioned couplers applied, the car moves to a sand blasting position where all old paint is removed. At this point, the new sheet steel panels are also sandblasted in preparation for painting. Twelve-gage sheet steel is used. The four sheets at the corners are 5 ft. ½ in. by 7 ft. 7 in. while the side sheets are 5 ft. 11 in. by 7 ft. 7 in. Before installation, the steel sheets are placed in a press devised at the car shops to form the top edge of each sheet so that it will fit up under the roof of the car properly.



7. Sandblasting to remove all paint and rust from the car and to clean the steel plates that replace the wood sides is done here.

8. When applied, the steel panels are spot welded to hold them in place until permanently fastened by continuous-bead arc welding.



9. The top edge of the steel panels is formed to fit underneath the roof of the car by this press built at the Springfield shops.

In the next position, the trucks are pulled out, dismantled and examined, defective parts replaced and journal boxes are cleaned and repacked.

With the trucks back in position, the steel sheets are tack-welded to the sides of the car and new grab irons, ladders and other safety appliances are riveted in place. The sheets are then welded to the frame, the flooring put in and a 1½-in. wooden liner bolted to the steel sides. After the roof has been repaired and the car has been painted and stencilled, it is ready to be put back in service.

The repaired cars, which have a capacity of 100,000 lb., average a 1,200 lb. increase in weight because of the steel sides.

Is Making Steel Grain Cars from Wood Box Cars . . .

10. Nailing the grain door after the new deck and lining have been installed.

11. The lumber came from a nearby mill by trailer and was hoisted, trailer and all, onto one of the shop service tracks.

12. The air brake system, the trucks, couplers and draft gears are thoroughly overhauled.

13. The steel cars, turned out at the rate of two per day by a force of 45 men, are 1,200 lb. heavier than the wood cars.

Airslide Covered Hopper Car

General American car of new design utilizes Fuller Airslide principle in unloading a wide range of dry powdered materials not previously shippable in bulk.

THE Airslide covered hopper car, recently built and exhibited by the General American Transportation Company, Chicago, makes possible for the first time the bulk shipment and handling of a wide range of dry powdered materials, such as feed stuffs, chemicals, starches and similar commodities. Substantial savings in containers, dunnage and labor will be realized by shippers who have not previously found bulk handling feasible. In addition, the car assures improved sanitation and less danger of contamination.

The Airslide car is built in capacities of 2,000, 2,600 and 3,600 cu. ft. to cover the whole range of powdered commodities of varying densities, the 2,600 cu. ft. size being adapted for the great variety of commodities having bulk densities of about 40 lb. per cu. ft. The center of gravity of the car has been kept well within the A.A.R. limitation of 84 in. above the rail.

The new car was designed in collaboration with the Fuller Company, Catasauqua, Pa., utilizing the Fuller Airslide which consists essentially of a fabric of special design stretched over a U-shape shallow steel channel. The channel below the fabric forms a plenum chamber into which air is introduced at a pressure of approximately 1 lb. per sq. in., and in varying quantities, depending upon the material to be transported. The Airslide slopes toward the center of the car, and as air is forced through the fabric, slowly permeating the commodity above the fabric, the lading is aerated and fluidized, causing it to flow like water to unloading point.

Loading is done by gravity through roof hatches, as usual. Lading may be moved from the car either by gravity or pneumatics into any conventional conveying system. The only essential added equipment, needed by the shipper, is a small, low-pressure blower, capable of delivering 200 cu. ft. of air per minute and costing about $500 to $600.

In order to assure minimum product retention in the car upon the completion of each unloading, the Airslide car design embodies the feature of all-welded butt joints where necessary and 60 deg. slope sheets, the angle of the Airslide itself being about 15 deg. Six vibrator brackets on each lower sheet permit safe mechanical jarring of the car body when necessary.

Optionally, a wax lining, non-toxic, possessing good corrosion-resistant properties, can provide the interior of the car with an exceptionally smooth surface. This wax coating is said to have been used for several years in GATX Trans-Flo cars with good results.

Other special equipment on the car includes: Barber S-2 stabilized trucks with Unit brake beams and Diamond

GATX AIRSLIDE COVERED HOPPER CAR MADE IN THREE SIZES

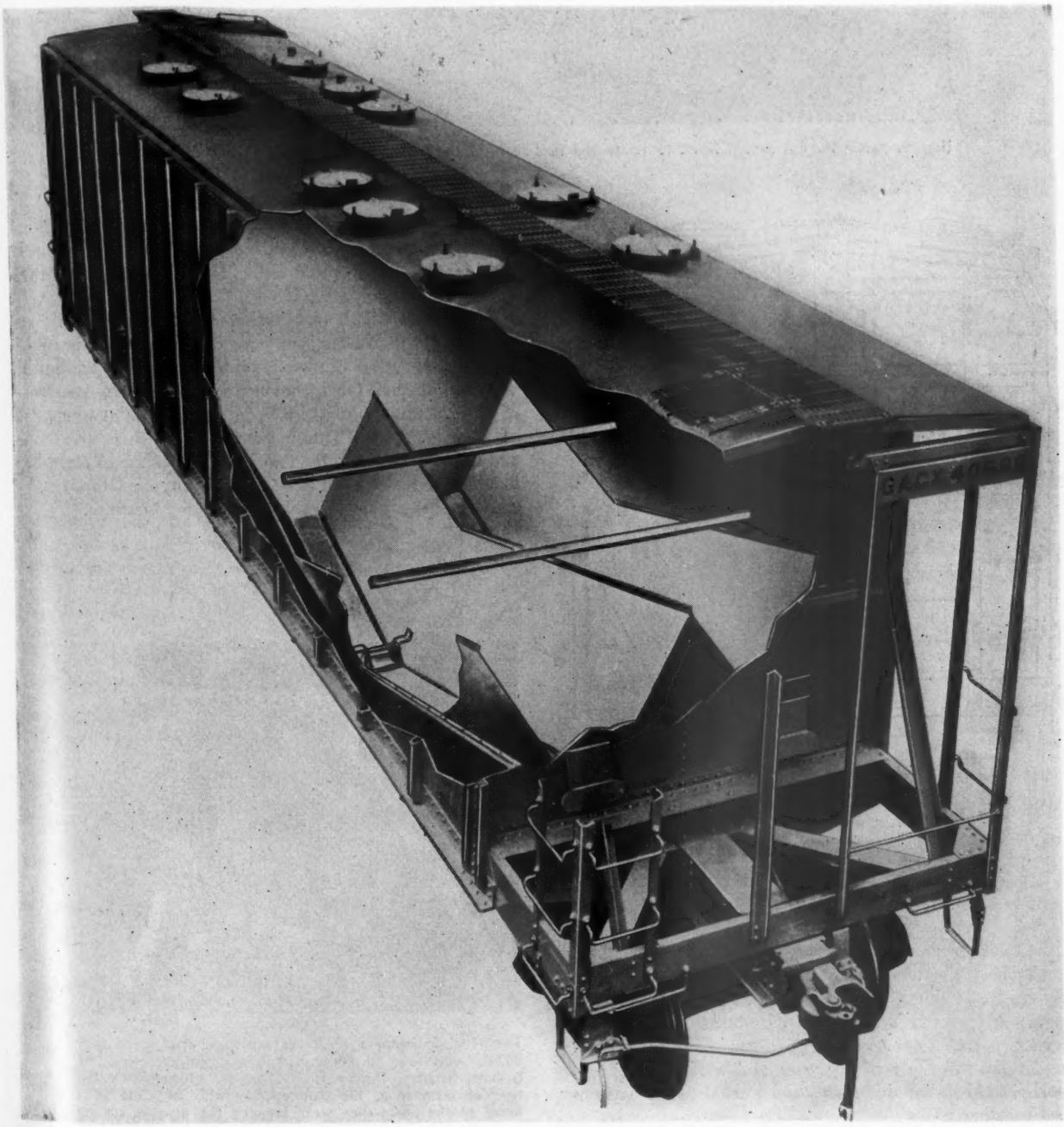
	70-ton	50-ton	50-ton
A.A.R. class, type	LO	LO	LO
Cubic capacity, cu. ft.	2,000	2,600	3,600
Light weight (estimated), lb.	53,500	54,700	62,500
Load limit (estimated), lb.	156,500	114,300	106,500
Length over strikers, ft.-in.	35–3	39–6	50–9
Overall width, ft.-in.	10–7	10–7	10–7
Overall height, ft.-in.	12–2	14–3	14–1
Number of loading hatches	8	4	6
Number of unloading outlets	2	2	4

S-type steel-back brake shoes; Miner A-22-XL draft gears and vertical-wheel hand brake; Type E couplers with Imperial rotary bottom-operated uncoupling device; Blaw-Knox running board and metal brake step.

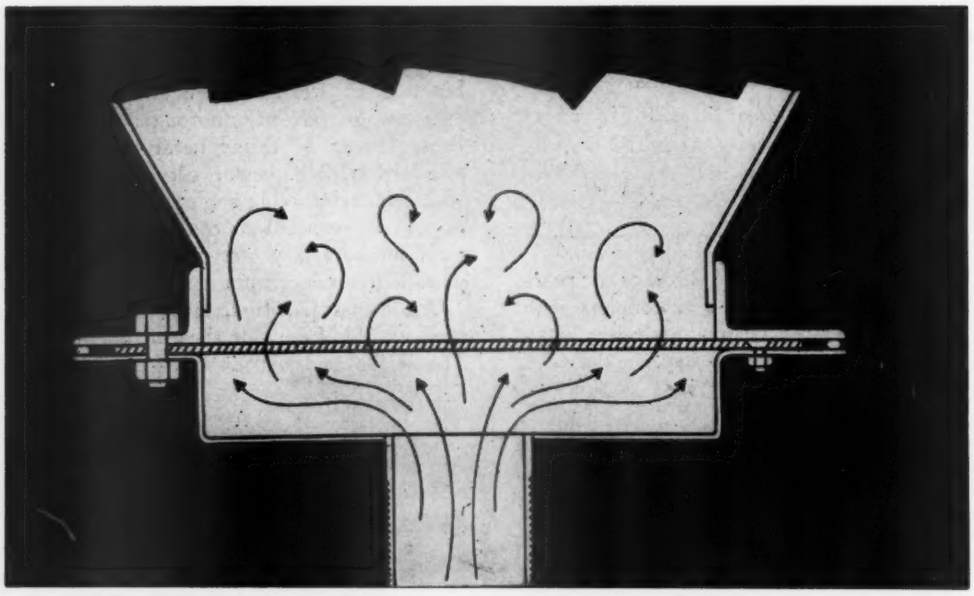
General Construction

The new Airslide covered hopper car embodies a combination of welded and riveted copper bearing steel construction, already thoroughly tested in the GATX fleet of cars of this general type. The two A.A.R. standard 51.2-lb. center sill sections are strengthened with 4-in. reinforcing angles applied on the inside at the bottom between bolster center fillers. The body bolsters meet all necessary strength requirements, as do other parts of the underframe and superstructure.

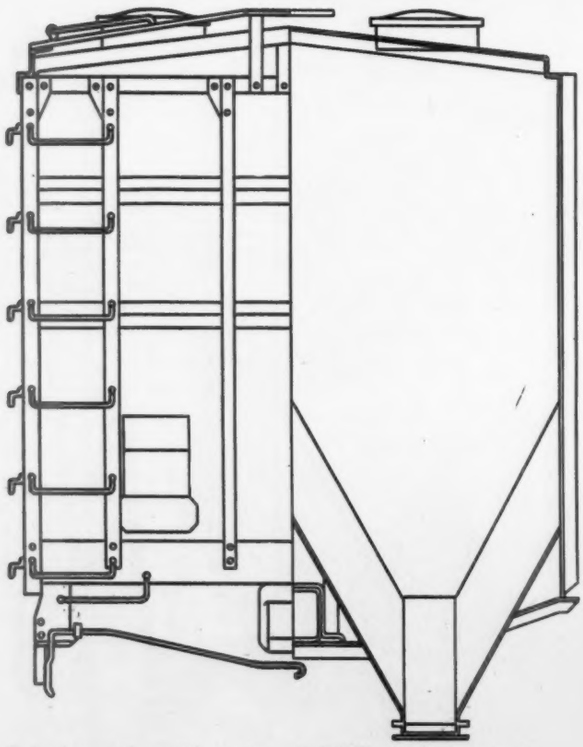
The center partition, made of ¼-in. copper bearing steel, extends from side sheet to side sheet in two pieces. The inside and outside slope sheets extend from end



How interior slope sheets are arranged.



How air passes through special fabric to aerate and fluidize the lading.



End view and partial section of GATX Airslide covered hopper car.

sheet to center partition in two pieces and are butt welded together at the unloading point. The side sheets are $\frac{3}{16}$-in. steel; side plates, $4\frac{1}{16}$-in. 10.3-lb. Z-bars welded to the 13 pressed U-shape outside stakes per car side; corner posts, $3\frac{1}{2}$in. angles; carlines 3-in. by $2\frac{1}{2}$-in. angles bent to the roof contour; and roof sheets $\frac{1}{8}$-in. steel riveted to the side plates and welded to the carlines and together.

Six loading manways per car are installed in the roof, also four unloading manways, unless provision is made for operation of the unloading gates from the ground outside the car, if preferred. The aluminum manway covers are left unpainted.

The interior of the car is shot blasted and given one spray coat of Nu-Surface penetrating wax if desired, before application of the Airslides which are equipped with the special fabric having a clear width, installed of 12 in. and supported by $\frac{3}{4}$-in. round bars at intervals of $17\frac{1}{2}$ in. apart. This helps the fabric carry the load and the round bars offer minimum resistance to air flow the full length of each slide. Air is supplied through a capped pipe nipple to each of the four Airslides.

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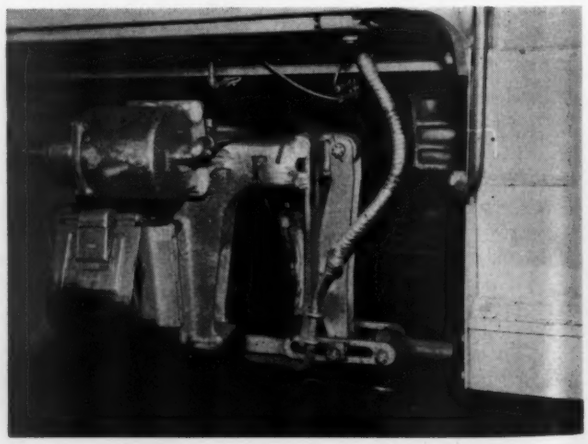
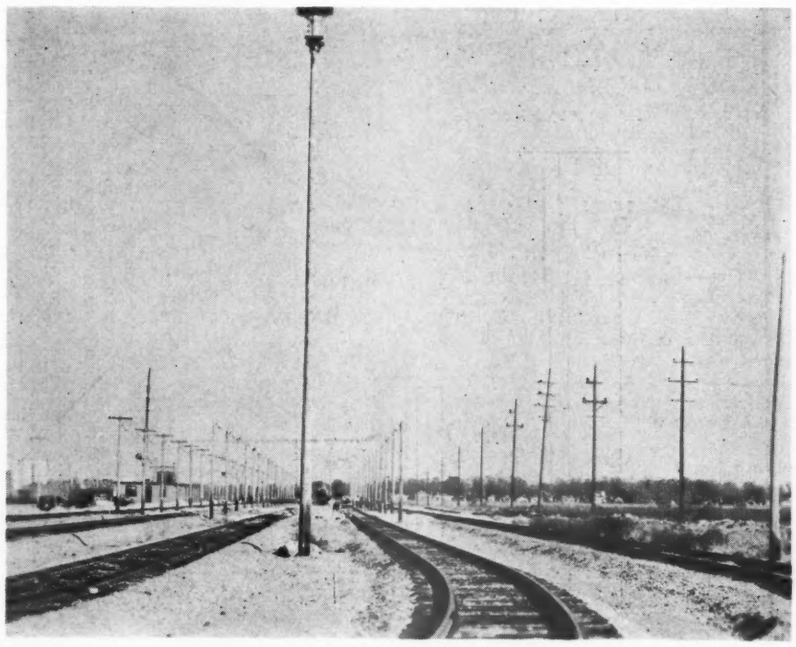


The Alton & Southern welds the sand pipe brackets of their diesel locomotives to the truck side frame and, with the U-bolts, positions the sand pipes to the wheels. With this type of installation, the pipe opening will not close as a result of the brake-shoe wear bringing the pipe in contact with the wheel, as was the case when the sand pipe was mounted on the brake hangers.



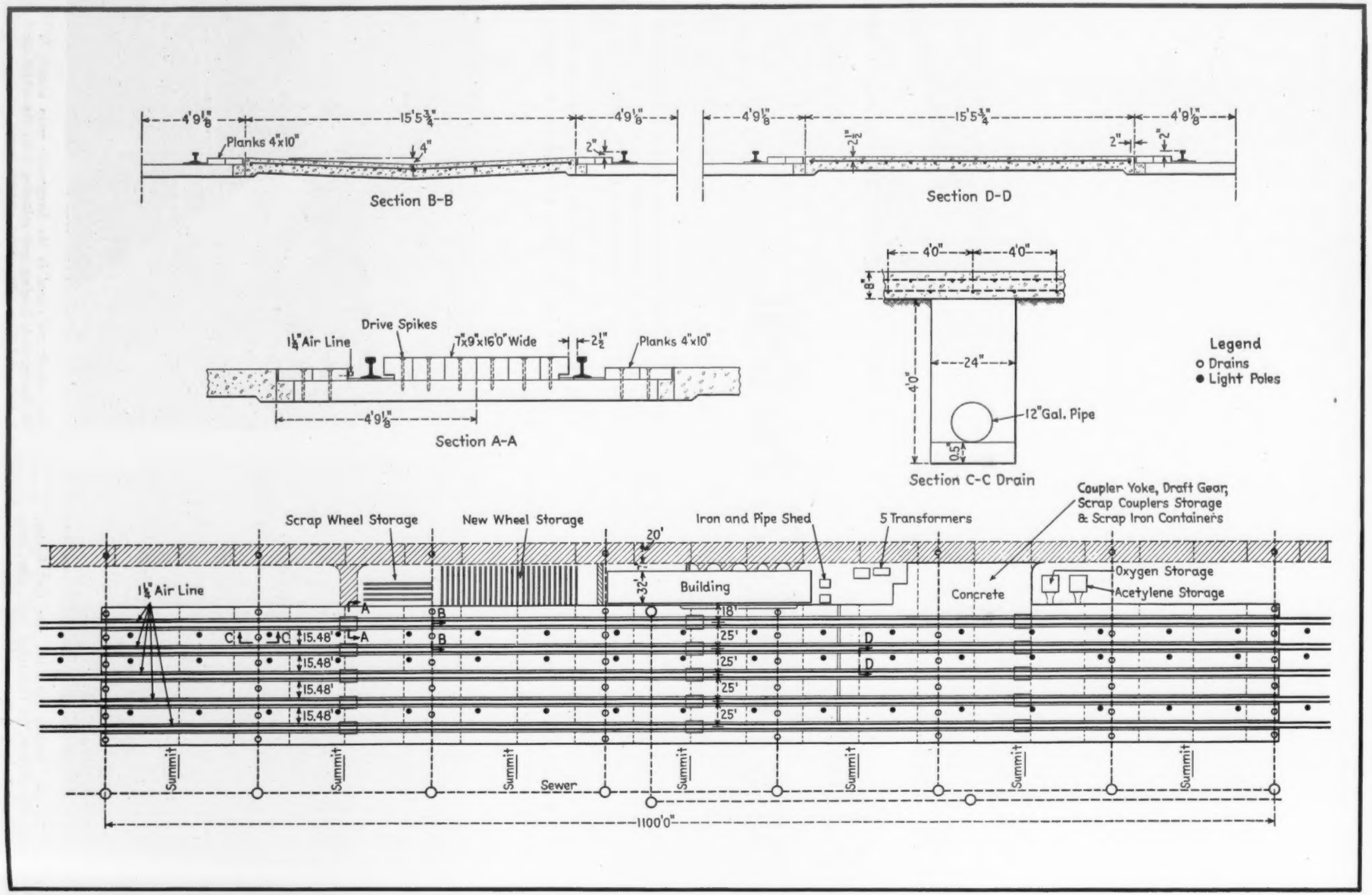
New IHB Rip Track Boosts Capacity 25 Per Cent

THE INDIANA Harbor Belt has recently completed a rip track at Blue Island, Ill., which has increased capacity 25 per cent, minimized the time needed to repair bad order cars, and has made it possible to do work at Blue Island that formerly had to be sent to other points.

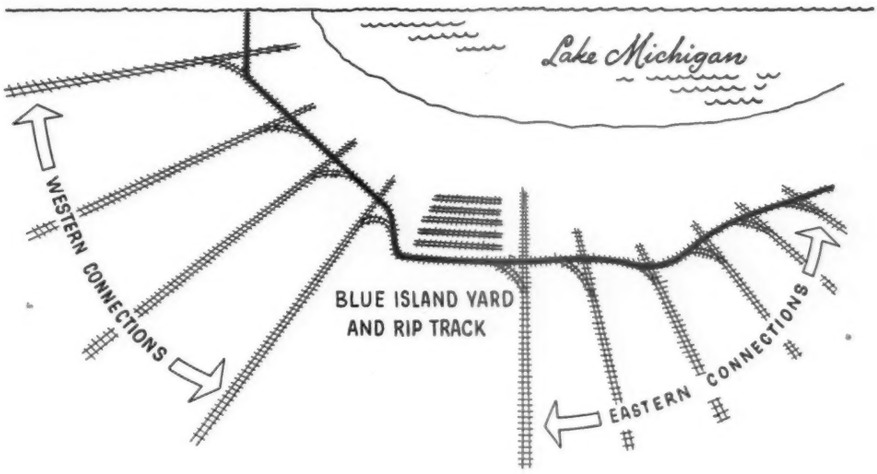
The overall light repair area is 1,100 ft. long and contains five tracks on 25-ft. centers. The areas between these tracks are concreted as are the areas beyond the two outside tracks for the entire 1,100 ft. The width of the strips between the tracks is 15½ ft., that of the strips extending beyond each of the outer tracks a little under 15 ft. Between the end of the concrete and the adjacent rail are two 4-in. by 10-in. wood planks to support car lifting jacks.

Fifty-seven 300-watt fixtures keep the area well lighted. The scoop on the truck in the foreground hauls snow, loose materials and trash to keep it clear.

New wheels are stored in the foreground; scrap wheels, in the background. Loading and unloading from the wheel car is performed by a rubber-tired portable crane.


4'9⅛"
15'5¾"
4'9⅛"
Planks 4"x10"
4"
2"
Section B-B
4'9⅛"
15'5¾"
4'9⅛"
2½"
2"
2"
Section D-D
1¾" Air Line
Drive Spikes
7"x9"x16'0" Wide
2½"
Planks 4"x10"
4'9⅛"
Section A-A
4'0"
4'0"
8"
24"
40"
12" Gal. Pipe
0.5'
Section C-C Drain
Legend
o Drains
• Light Poles
Scrap Wheel Storage
New Wheel Storage
Iron and Pipe Shed
5 Transformers
Coupler Yoke, Draft Gear, Scrap Couplers Storage & Scrap Iron Containers
20'
32'
Building
Concrete
Oxygen Storage
Acetylene Storage
1¾" Air Line
A
B
C
D
15.48'
18'
25'
Summit
Sewer
1100'0"

← Layout of the light repair area at the Indiana Harbor Belt's Blue Island Yard showing how adequate drainage is affected by the series of summits and valleys.

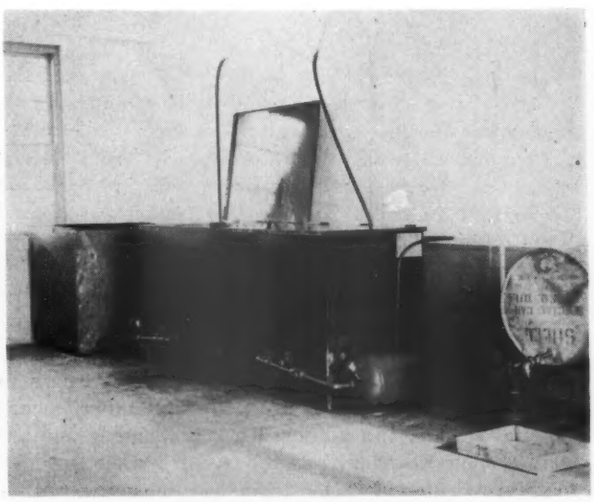


The Blue Island Yard is strategically located between the areas where eastern and western connections cross the IHB.

The repair tracks are open on both ends. Bad order cars enter the repair area from one lead track, receive repairs, and leave on the lead track on the opposite end. As all cars move in one direction, movement of perishable bad orders is expedited.

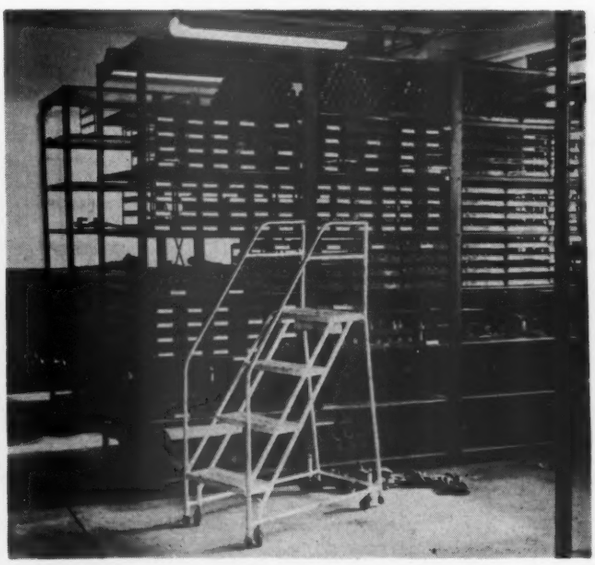
To permit 24-hr. operation, the entire area is illuminated by 57 300-watt light bulbs in boulevard-type fixtures suspended from wood poles. These poles are spaced about 65 ft. apart so that when cars are spotted for repairs both ends of each car will be illuminated to near-daylight conditions. They are set off-center on the concrete strips to permit passage of trucks between the pole and the adjacent freight car. All poles are of wood partially because of a steel shortage when they were ordered, and partially because it was felt that it would be easier and cheaper to replace a wooden pole if damaged by a truck or car than it would be to repair a steel pole.

Repair gangs are assigned to the first and second shifts. Loaded bad order reefers are worked on the third trick by inspector-repairers who are used to handle rush cars.

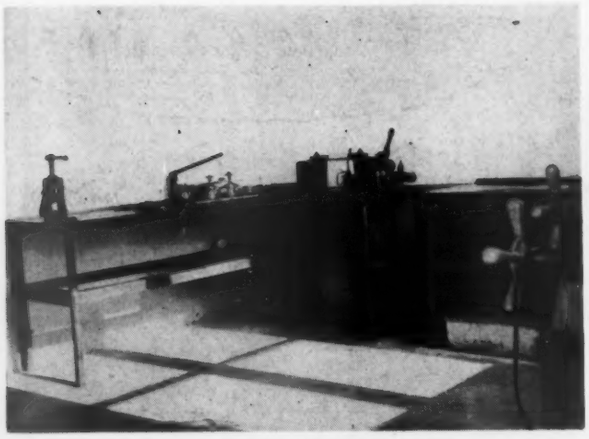


Oil drains from waste stored in the big tank into mounted drums. Air pressure on the drums delivers the oil through the upper piping to re-saturate the waste.

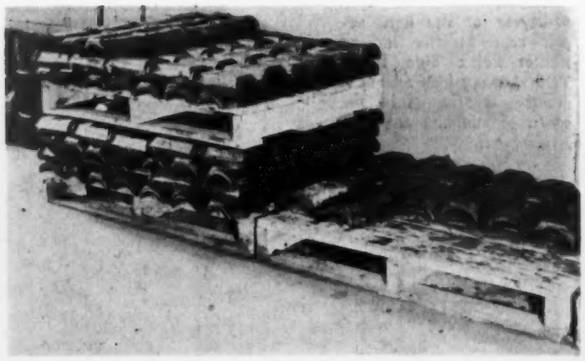
Building constructed on the north edge for the office, stores and miscellaneous repairs. Heavy planks border the tracks to support jacks for wheel changes and truck repairs.



The ladder used in the storeroom is supported from the wheel frame by springs. When stepped on, the springs are compressed and the ladder rests on the four legs.



Air-brake and miscellaneous pipe work for bad-order cars is done in this room.



Journal-box brasses are palletized to permit delivery to the storage area by lift truck, and are stored on pallets until ready for use to conserve space and reduce damage.

Drainage is one of the most important features of this rip track. It is attained without sacrifice of an absolutely level grade for the track and the jacking planks. The dip in the center of each runway varies from zero at each of the seven summits to four inches in the valleys between the summits. The water is carried away by 55 drain openings located in valleys throughout the area.

Air jacks and tools are operated from a 1¼-in. line along the outside of the north rail of each track. Outlets are approximately 65 ft. apart. Three sets of five crossovers 16 ft. long permit passage across the tracks. Other mechanized equipment includes two fork lift trucks to deliver wheels, a platform truck to haul miscellaneous material around, and a crane truck for loading and unloading mounted wheel sets. A scoop bucket is added to the fork lift trucks for trash and snow removal. A 25-ton diesel-powered locomotive crane straightens loads.

The original motivation for building the new rip track was the need for seven new classification tracks at Blue Island. As the most desirable location for the new classification tracks was the area occupied by the former rip track, it was necessary to select a new location.

The south side of the yard was chosen for the spot to locate the new light repair area because space was available to do a first class job on the layout. The result is a rip track where bad order cars can be repaired in minimum time, a necessity for a point like Blue Island which is the key to the fast handling that is a must for belt lines like the IHB.

Blue Island is the "hot point" of the system as it lies between the area where western connections entering Chicago cross the IHB and where the eastern connections cross. It is therefore the classification point for all perishables heading east. Some other freight heading east is also classified at Blue Island, as are some of the westbound empty reefers.

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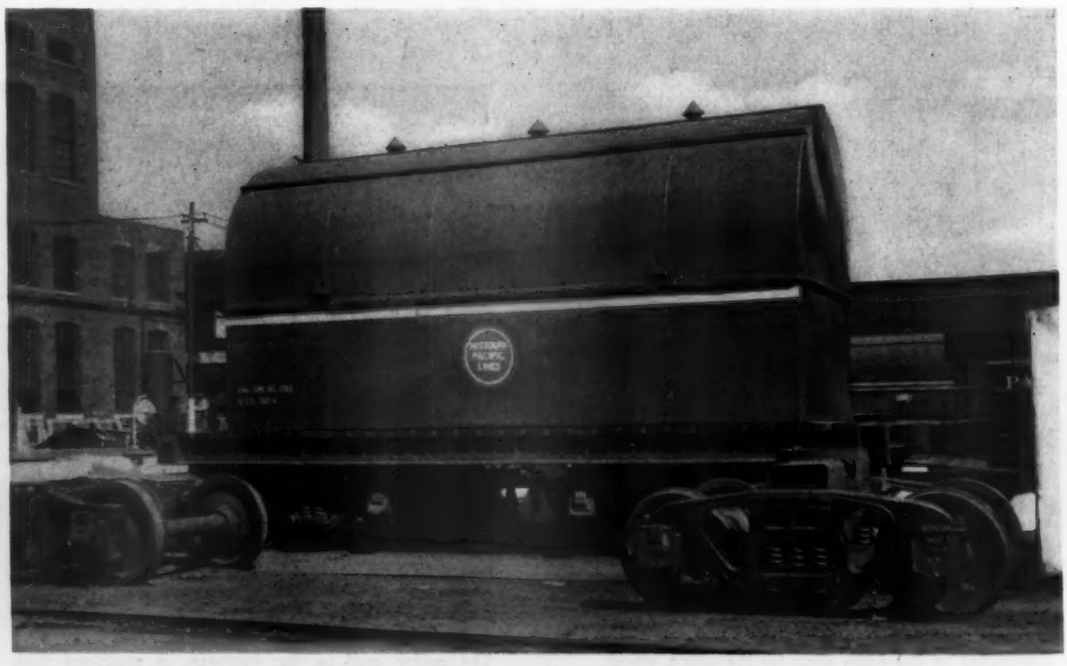
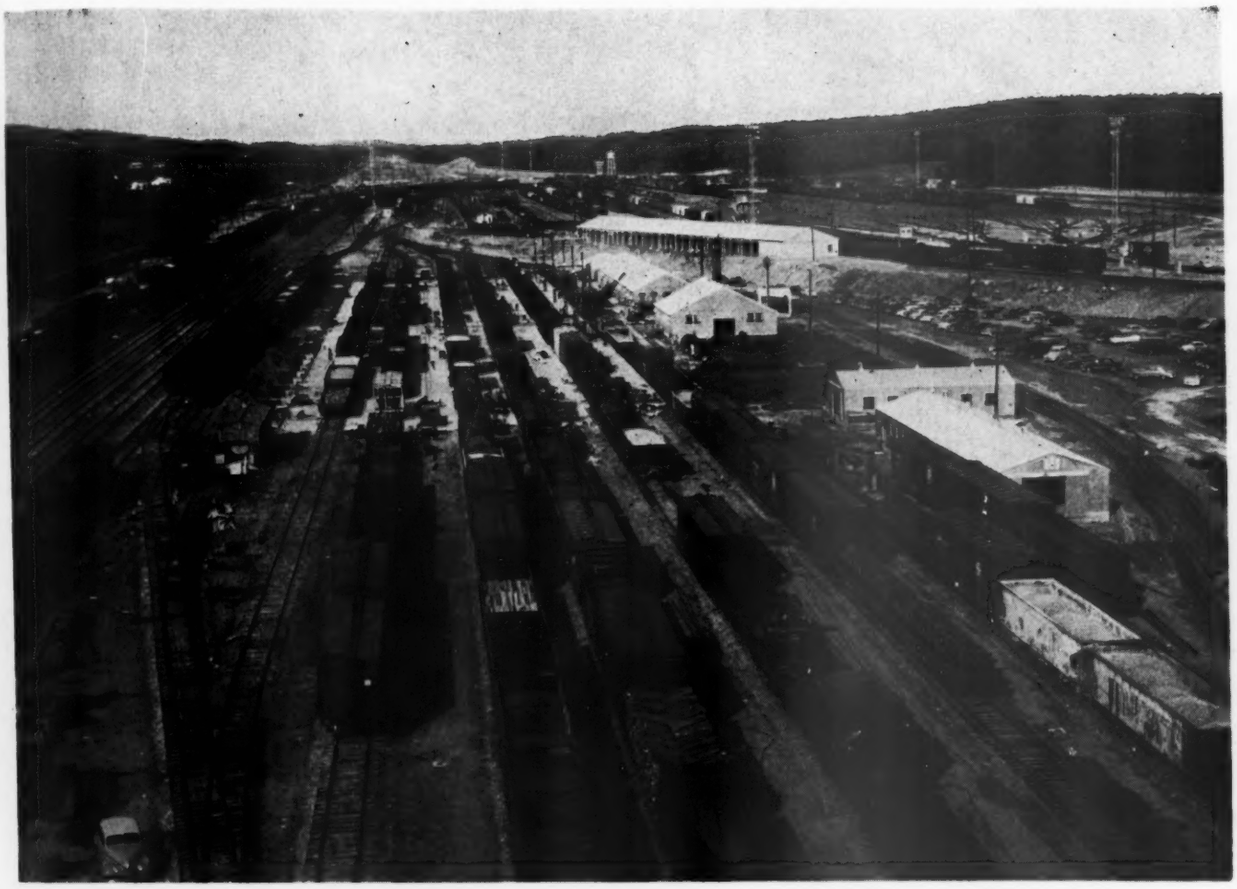


Diesel engines overhauled at Little Rock on the Missouri Pacific are stored outdoors in metal containers which afford protection from the weather and avoid taking up shop space.



Light repair yard recently placed in service in a large classification yard.

The Jobs That Constitute
Light Freight-Car Repairs

Considerations affecting the location and method of operating small and large repair tracks. Recommendations as to facilities and tools. The value of covered repair tracks stressed.

BY R. H. HERMAN

[Mr. Herman, who is engineer shops and equipment of the Southern, is the author of the section on Freight-Car Repairs which will appear in the forthcoming edition of the Car Builders' Cyclopedia. This article is taken from part of the section dealing with light repairs. The Cyclopedia will be ready for distribution during the summer.—Editor.]

LIGHT freight-car repairs can be considered as comprising repair, renewal or overhaul work which can be completed in one, two or three days. Such work might consist of one or more of the following operations:

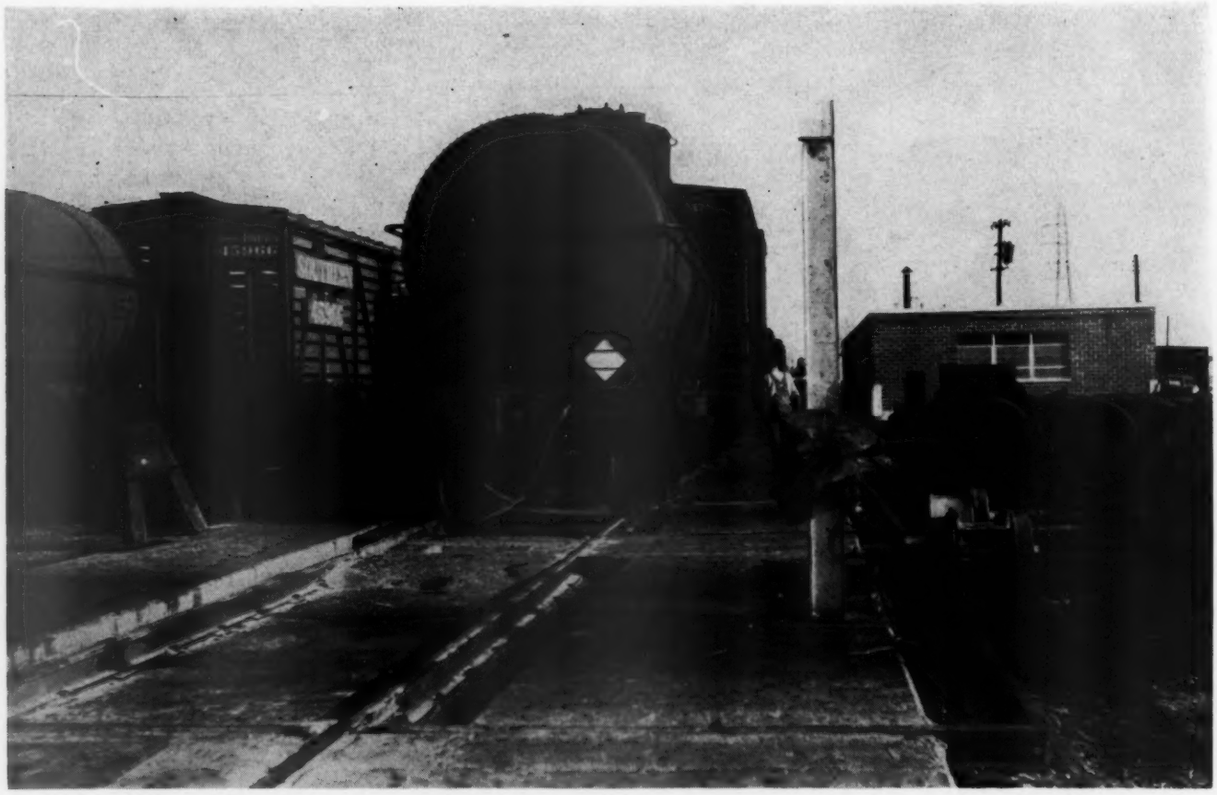
Repacking journal boxes.

Replacement, repair or cleaning of air-brake equipment.

Renewing brake shoes, levers, rods or pins.

Changing worn or defective wheels, truck side frames or bolsters.

Renewing or repairing ladders, steel running boards, platforms, door hinges, latches, etc.



Light repair yard platforms and wheel storage tracks showing dolly car used for moving wheels in pairs.

Patching, renewing or repairing corroded or broken plates, angles, side stakes, center sills, and steel underframe parts.

Patching or replacing wooden floors, lining, running boards, etc.

Repairs to sides, ends or roofs.

Installation, adjustment or repairs to special loading devices.

Repairs to upgrade cars for a higher commodity classification.

The larger repair shops can be set up to perform certain of these operations on system cars on an annual or periodical basis. Such operations may include repacking journal boxes, inspection of draft gear, cleaning of air brake systems and reweighing and stenciling cars.

The preparation of cars for higher commodity loading is also an important function of any light-repair yard. Cars for commodities such as flour, grain, sugar and like materials subject to damage must have good floors, sides and roofs to prevent damage from rain, ice, snow or cinders entering the car. Box cars for this type of loading should be reworked on the repair track to insure continuance in service for at least one year, must have floors, linings, and roofs reconditioned and the car thoroughly cleaned and decontaminated. In some cases extensive use is being made of paper liners to insure tightness in a car which otherwise would not be suitable.

General

The shortage of practically all types of cars for revenue loading plus the fact that new car building is not keeping pace with retirements makes it essential that repair tracks be designed and equipped to complete such repairs in the shortest possible time. This is even more important on a repair track where an appreciable percentage of the cars handled are loaded. Each hour of delay in inspection, classification, switching, repairs and return of the car to service represents that much delay in the receipt of the shipment by the consignee. The stiff competition offered by competitive freight transporters increases the demand by railroad managements for prompt and efficient repairs.

There are a number of factors which should receive serious consideration when planning new or remodeling old light freight car repair facilities to provide the most efficient and economical operation.

1. The location of the light repair shop is particularly important. It should be adjacent to a classification yard, terminal yard or interchange point so that bad-order cars can be placed in the repair yard without delay. Practically all the new retarder type classification yards have a sizeable repair track so located that a switch engine can place and remove cars at least once a day or in some cases once each shift.

2. The repair yard should be provided with through tracks and a switching lead at both ends. If placed adjacent to the hump, a switch engine can pull cars out of the bad-order track in the classification yard and place them in the near end of the repair track. The same switch engine or another can pull repaired cars from the opposite end and place them either in the receiving yard or push them over the hump. With such an arrangement switching moves are reduced to a minimum.

3. The size of the repair-track layout will depend en-

tirely on the number of cars to be repaired in 24 hours, the extent of such repairs, type of car, frequency of switching and size of car-repair force. A careful study should be made of the maximum number of cars to be repaired at one time to determine track standing space required.

4. Machinery, equipment, tools and labor saving devices should be provided to reduce time required for various operations and expedite repair work.

Car Inspections

The inspection procedure for freight cars varies considerably in different yards and terminals dependent on the arrangement and number of cars handled. In one large classification yard cars receive an initial inspection in the receiving yard. As the train pulls into the yard brakes are applied to resist the pull of the locomotive and take up slack action so that when the train is stopped drawgear is stretched out. Car inspectors start at both ends—also from the middle on a long train—inspecting couplers, draft gears, air-brake piston travel, opening lids of journal boxes and inspecting packing. As the car inspectors complete their work a trainman releases the brakes to ready cars for movement over the hump. Any cars with defects are carded for the repair track.

In addition to the receiving-yard inspection, each car also receives a supplementary underframe and truck inspection from two men in glass enclosed booths, one on each side of the track shortly before the car reaches the crest of the hump. Practically all new retarder classification yards incorporate some form of this type of inspection. This has proved to be very effective in locating defects in truck side frames, wheels, air-brake system and underframes which might otherwise be missed by the receiving-yard inspectors. When one of these inspectors locates a defect he notifies the hump conductor accordingly and the car is classified to the bad-order track for necessary movement to the repair track.

After repairs are completed the car is switched back to the receiving yard or shoved over the hump to be reclassified for its original destination.

Car inspectors again travel the length of the train for the departure air-brake test and at the same time close journal-box lids and make another general inspection.

All possible minor repair work should be performed in the yard to avoid movement of the car to the repair track with resultant delays. Car inspectors should be able to replace worn or broken brake shoes and keys, adjust packing, replace cotter pins, etc., without seriously delaying yard operations.

Light Repair Track

The physical size of the repair track facilities will depend upon the volume of work to be performed. A small repair shop located at the end of a branch line, an interchange point or small yard where 10 or more men are employed exclusive of train yard inspectors or oilers, should have necessary buildings for an office, wash and locker rooms for employees and a storeroom to house all material except wheels, bolsters, truck sides, couplers and draft gears. The operation may be so small that a shed roof or building over the repair track is not justified, except in areas where extremes in weather are encountered.

The roadway beside or between the working tracks

Pneumatic jacks save time and cut down delays in car-repair operations. The concrete is a foundation for the jack.

should be of concrete or other hard surface to permit haulage of jacks, wheels, couplers, draft gear, etc., from storehouse or storage platforms to a car undergoing repairs. The platform should be extended to connect with storehouse, shop buildings and an access road.

A minimum facility should also include a crane truck, pillar or jib type crane with power hoist for loading and unloading wheels. A crane truck is very desirable since it can be used for handling all types of heavy material as well as for the loading, unloading and handling of wheels.

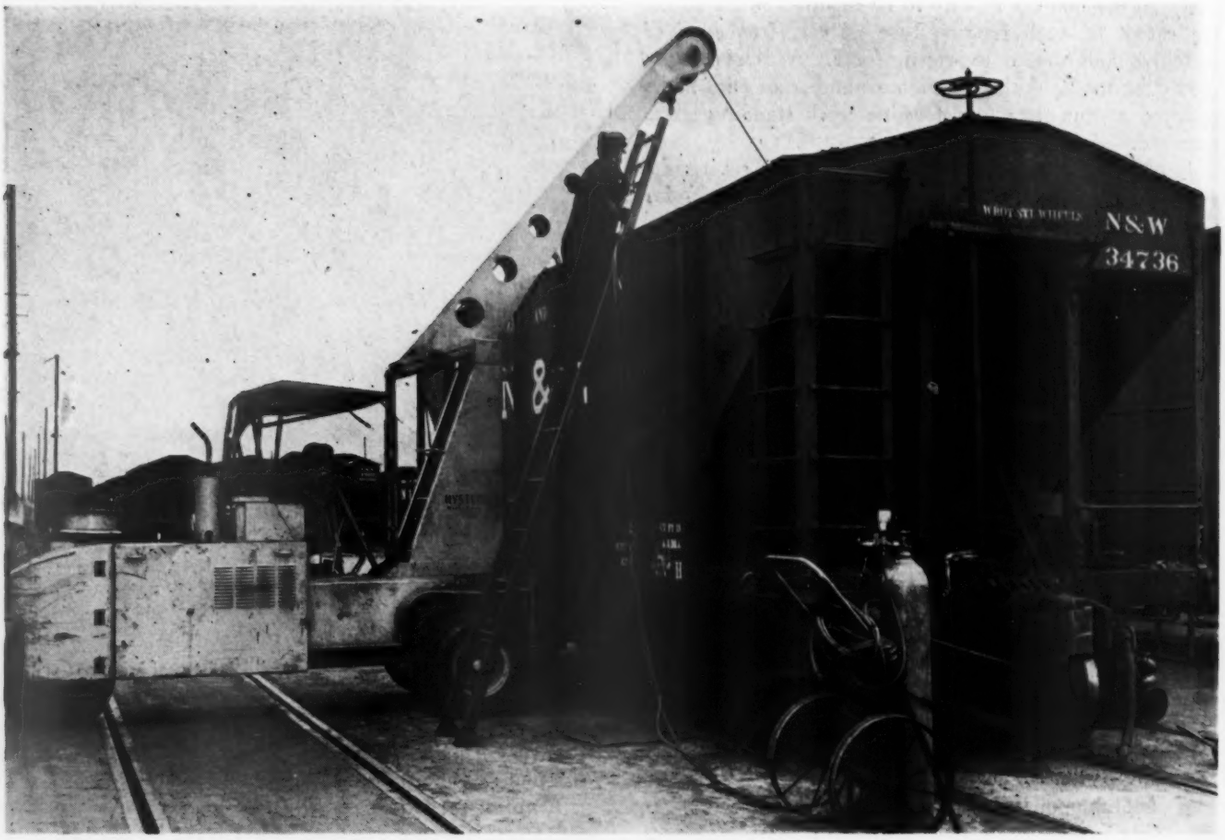
An air compressor with necessary piping and outlets at all convenient locations is essential. An electrical distribution system should have outlets for an electric welding set and electric tools and floodlighting if necessary for night-shift work.

Large Repair Tracks

The layout of a large repair track where 50 or more car repair men are employed is dependent primarily upon the plan of operation, i. e., whether cars requiring repairs are placed at any repair position in the yard, moving men, tools and material to each car, or whether the spot system is used, moving the cars to be repaired from one point to another for progressive repairs and segregating cars which require wheel change. Cars for wheel change or other truck repairs are placed on one or more tracks and moved successively to a location with permanent jacking pads or blocks, pneumatic jacks and a fixed or portable frame or hoists for dismantling and assembling truck sides, bolsters, etc. The wheeling location must be adjacent to wheel storage tracks with crane, dolly car or turntables, as required, for easy movement of wheels to and from the working area.

The spot system for miscellaneous light repair work can be used effectively and will show economies in those repair yards where the cars to be repaired are predominately of one class or type.

On the other hand it is difficult if not impossible to set up a repair track operating entirely or partially on the



Straightening car sides is one of the many jobs performed by motorized equipment.

spot system if all types of loaded or empty cars must be handled and repairs vary from light operations such as renewal of running boards, repairs to safety appliances, etc., to straightening or renewing bent sheets, ends, doors or other heavy work on open top or enclosed cars.

It is possible however to use the spot system for wheeling cars even though its use on the repair track is not justified. It is essential to the success of such an arrangement that cooperation of the Transportation Department be assured since cars requiring wheel change must be segregated from other bad-order cars. A careful study is required of all factors to determine which system to use.

Paving

Paved platforms or roadways between an outside tracks in the working area are essential for ease in handling material, supplies and equipment.

The cost of such paving will be more than justified by providing good working conditions even in bad weather, a firm surfaces for all types of material-handling equipment, and by reduced working hazards.

The concrete between tracks should be below the top of the rail and recent installations with surface at the top of the tie have proven very satisfactory. The concrete adjacent to the end of the ties should be thick enough and reinforced, if necessary, to make a firm foundation for jacking. Short ties, 7 ft. long, should be used for the track and the edges of the jacking blocks installed 3 ft. 8 in. from center line of track.

Track crossings must necessarily be at rail level which will require slight ramps from the lower platform to this level but this has not proved to be objectionable.

Shop Buildings

It is desirable, particularly at a small car-repair facility to house all shops, offices, etc., in one building from the standpoint of lower first cost and convenience. Plumbing, heating, light and other services are simplified. The building or buildings should parallel one side of the repair track area and be convenient to the entrance roadway.

Wash and locker rooms for employees should provide toilets, wash basins, preferably circular type, shower stalls, individual full-length lockers and space for eating lunches.

In addition to the service buildings serious consideration should be given to the desirability of having a shed roof or even an enclosed building over the actual repair track area. There is an increasingly greater trend in this direction particularly in areas in the nothern section of the country where extremely low temperatures are experienced in the winter months, in coastal areas where heavy rain falls are encountered and in the south for protection from the hot summer sun. Elimination of lost time and delays due to bad weather may justify the cost of such a building. Regardless of whether it is a shed roof or building it should span all the repair tracks with no intermediate columns, permit wide platforms between and have skylights in roof and sash or glass on sides and ends for adequate lighting.

Machinery and Equipment

The amount of machinery and equipment needed will be dependent upon the volume and type of work to be performed. The small repair yard and in many cases even the larger yard can be supplied with prefabricated parts, precut lumber and reconditioned air brake, truck and draggear assemblies from a central location which will reduce amount of such work at the light repair shop.

The following list covers a typical list of machinery and portable equipment for a large repair yard performing one-, two- or three-day repairs.

Repair-Track Area

Portable 300- or 400-amp. electric welders.

Oxy-acetylene tanks with torches, hose, etc., on push car or buggy.

50- or 75-ton pneumatic jacks for empty or loaded cars.

Hydraulic or geared journal jacks.

Ratchet or screw jacks for light operations on journals, springs, couplers, and floors.

A portable or stationary end-straightening device.

Overhead jib crane, portable frame or device with hoists for dismantling and assembling trucks.

Portable single-car air-brake test devices.

Special devices for operations such as handling car doors, renewal of door travel mechanism, etc.

Portable pneumatic or electric drills, reamers, hammers, grinders, saws, weld flux chippers, impact wrenches, sanders and motors for raising and lowering auto loaders.

Metal cabinets, cupboards or racks at convenient locations to store frequently used material and parts.

Metal-Working Shops

Journal-turning lathe.
Single- or double-head bolt threader.
Radial drill press, 5- or 6-ft. arm.
Punch and shears.
Magnaflux testing machine.
Double emery grinder.
Steam or power hammer.
Oil or coal forge.
Heating and annealing furnace.
Hydraulic or pneumatic straightening press.
Hydraulic or pneumatic forming press.
Pipe threading machine.
Anvil and face plate.

Air-Brake Room

AB brake test rack.
3T air-brake test rack.
Double emery grinder.
Wire brush and buffing wheels.
Small drill press.
Benches, cupboards, racks, cleaning tanks, etc.

Wood or Planing Mill

Four-side planer or single surfacer.
Band saw.
Cutoff saw.
Combination wood worker.
Rip saw.
Boring mill.

Material Handling Equipment

The well-equipped car-repair yard should have a gasoline- or battery-powered traveling-crane truck of 8,000 to 10,000 lb. capacity. This unit can be used to load and unload wheels and heavy materials, carry mounted wheel sets to and from storage tracks, handle doors, etc., in repair operations, as well as for straightening car ends, shifting loads and numerous other duties. It will be found to be much more versatile than the locomotive type on-track crane.

A gasoline- or electric-powered fork lift truck can be used to handle material on skids, mounted wheels and other similar items as well as assisting in actual repair operations. Similarly, a gasoline tractor with trailer is a valuable piece of equipment. The tractor may be used for occasional shifting of cars if it is of sufficient capacity.

Small- gasoline or battery-powered platform trucks will more than pay for themselves in hauling light materials and supplies from storehouse to point of use. Oxy-acetylene tanks, electric welders or supply cabinets can be mounted on these platform trucks for mobility.

Hand wagons, trucks or buggies are valuable for tools, supplies or materials and can be moved from one location to another. They should be made as light as possible with ball or roller bearings on axles. A gasoline- or battery-operated dump barrow is very desirable to handle small materials or to collect and dispose of waste materials.

A highway truck with either pickup or stake body should be available for use in car-repair operations. Such a truck can haul men, materials and supplies for repacking journal boxes or emergency repairs at outlying plants or on line-of-road.

Material Storage

The storehouse room or building mentioned in the preceding section should have adequate space for storage of bolts, nuts, small materials and supplies in bins, racks or cupboards. Heavy items of car material can be stored on outside racks or platforms.

Wheel storage tracks should preferably be arranged at right angles to the repair tracks with concrete paving at both ends. The most desirable permits unloading wheels from a car and placing them at one end, removing them at the other end. There should be sufficient double storage tracks to permit classification of wheels by journal sizes, steel or cast iron, new or reworked and also for defective wheels for outgoing shipment.

Communications System

A telephone or telephones should be installed in the offices connected to the system telephone circuits for communication with division or general offices. The newer repair yards are equipped with either a talk-back loudspeaker system with speakers located throughout the general area or with a combination paging and telephone system.

The latter system is more costly but it has the advantage of allowing more than one conversation at a time, keeping conversations secret and permitting rapid transmission of messages or announcements. Installation of an adequate communication system is essential to the operation of any sizeable repair facility.

AB Valve Cleaning at Milwaukee Shops

AB valves, shipped in from outlying points on the Chicago, Milwaukee, St. Paul & Pacific, are received at the company shops, Milwaukee, Wis., in standard material skids partitioned into twelve spaces, six for service portions and six for emergency portions, or, six car sets complete.

The incoming skid is placed adjacent to slide *S* which is hinged at one end and capable of being raised at the other by means of an air cylinder. The valves are removed from the skid and placed on the slide, which is then raised. The elevation is such that the valves are fed to the cleaning bench *C* by gravity. In placing the valves on the elevator, three service portions are followed by three emergency portions. This is done to avoid too much changing of the wrench sockets and still maintain a flow of complete valves.

The entire operation of cleaning an AB valve is divided into three parts and employs three men. At Position 1, the following work is done: Shipping cover removed; valve portion dismantled; gaskets faces of valve body cleaned on revolving wire brush *B*; chokes removed and valve body cleaned; emergency piston assembly dismantled, cleaned and re-assembled; back covers and release valve portions placed on fixed gravity slide *F*.

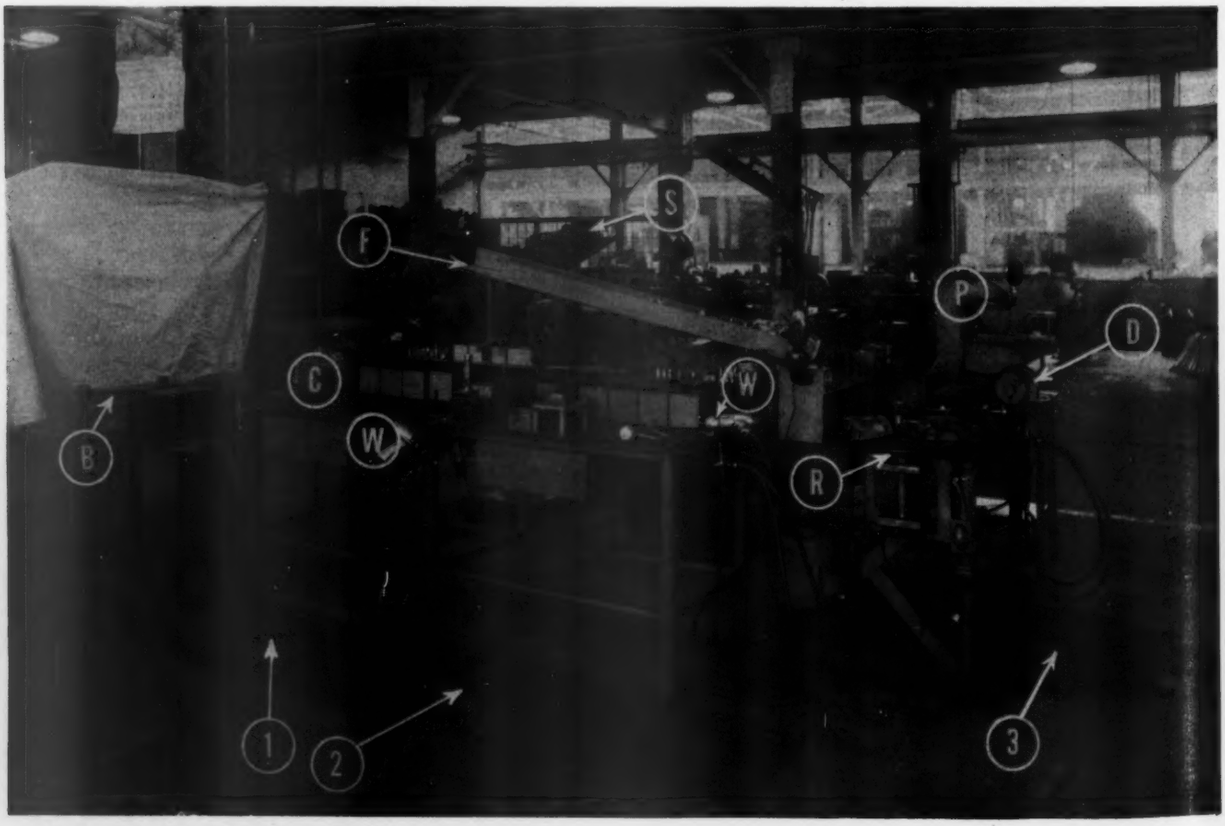
At Position 2, the service piston assembly is dismantled, cleaned and re-assembled; gages and chokes replaced; valve portion assembled complete.

At position 3, the back covers are dismantled and gasket faces cleaned with a wire brush mounted on motor at *D;* service portion back cover straightened in press *P*; release valve portion dismantled, cleaned and re-assembled; check valve and vent valve seats supplied as required at Position 2.

To facilitate the removal and replacing nuts and cap screws, impact wrenches *W W* are supplied at Positions 1 and 2. To assist in cleaning the various recesses in the valve portions, a fiber brush is used with a small air drill at Positions 1 and 3. A revolving disc *R* of very fine emery cloth is used for touching up slightly-worn flat check valves.

The three men employed in this operation turn out 15 service portions and 15 emergency portions in eight hours. This is a conservative estimate of production as the approximate time is 41 min. per valve portion from floor to test rack.

The cleaned valve portions proceed from the cleaning bench to the test racks where partitioned skids are located to receive the valves that pass the tests. Valves failing to pass the tests are passed to the repair men who are located adjacent to the test racks, for the necessary repairs. When a valve needs repairs such as slide, graduating valve or piston ring, all parts are subjected to the A.A.R. wear gages. The only gaging done at the cleaning position is of orifices in the various chokes.

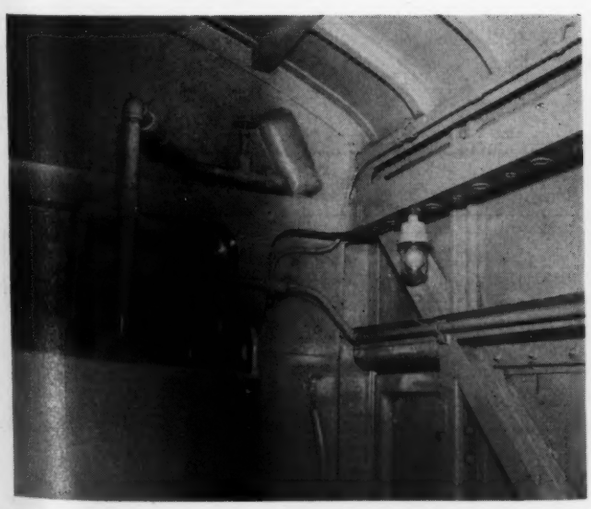


AB valve repair bench in air-brake room at Milwaukee shops.

ELECTRICAL SECTION

An E.M.D. type FT diesel-electric freight locomotive which was rebuilt in the Baltimore & Ohio's Glenwood Shops at Pittsburgh, Pa., following a 10-year, 1,079,000-mile service period.

Ducts for Rewiring Locomotives



Rear end of a B unit, looking forward, on the engineer's side. This shows Wirewa crossing the engine cooling water radiator bulkhead, with a T connection leading into the rear of the high voltage cabinet.

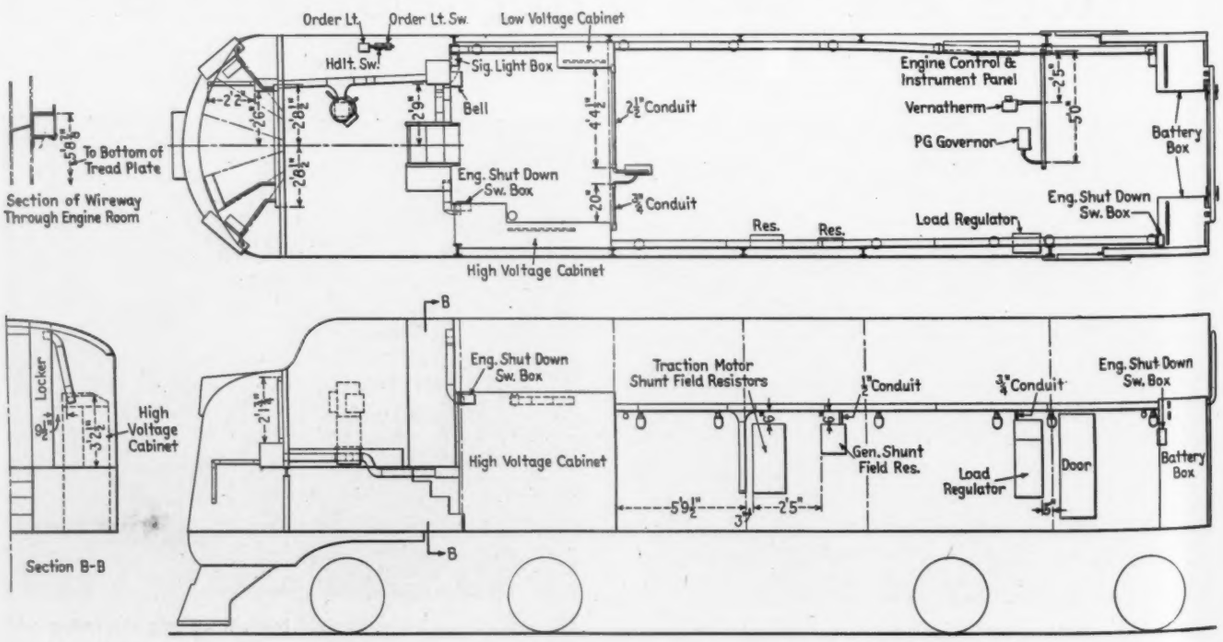
An application of 12-in. terminal boxes fitted into the system with outlets to the engine room light switch, engine shut down switch and battery charging receptacle.

A section of the duct with the cover raised to show how the wire is laid.

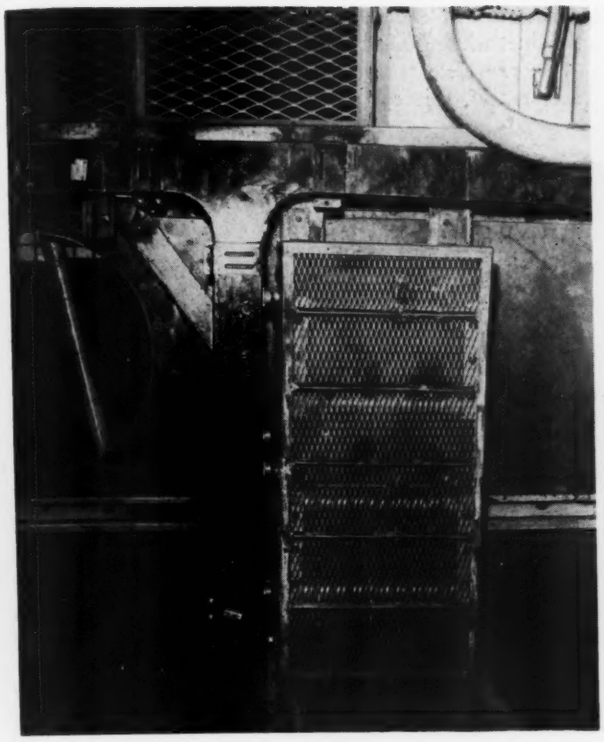
In the process of rebuilding a number of Electro-Motive Type FT diesel-electric locomotives, the Baltimore and Ohio has developed a means of using metal duct instead of conduit for most of the locomotive rewiring. This product, called Wirewa, was designed originally for the wiring of buildings and other structural wiring, and has been adapted to use on diesel locomotives without the need of developing special fittings or parts.

Nearly all of the wire and cable on the locomotives is being renewed. The varnished cambric-insulated wire with which nearly all diesel locomotives were originally equipped, is being replaced with R.H., rubber-insulated neoprene-jacketed wire and cable.

The Wirewa which is rectangular measures four in. by four in. in section, and is supplied in lengths of one to five ft. It is mounted inside on both side walls of the locomotive, as close to the roof as practicable. Hinged covers provide for opening the duct along its entire



Plan and side elevation of an A unit showing location of ducts, cabinets, control boxes and lights.



The traction motor shunting resistor cabinet is mounted as high as possible on side of the locomotive and circuits brought in as shown.

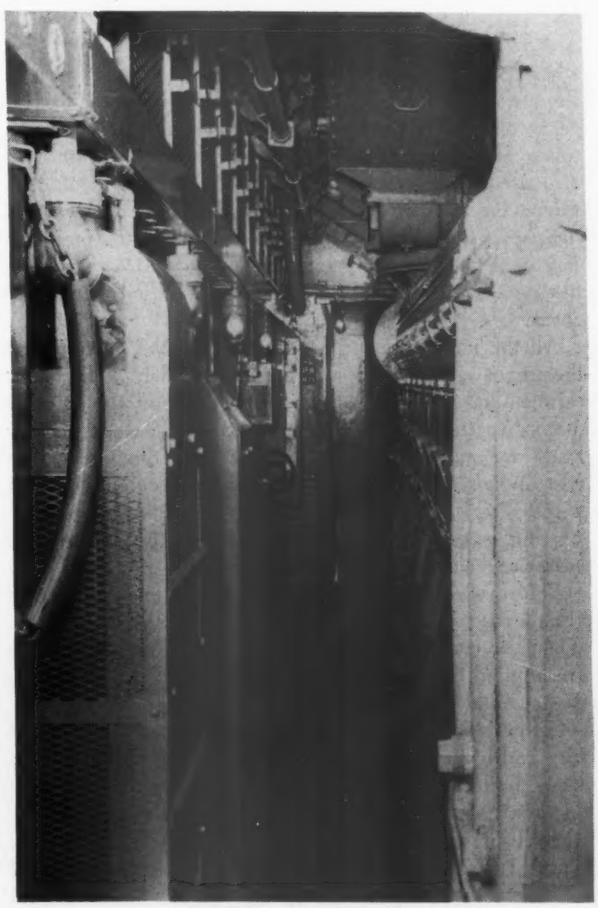
A run of Wirewa coming from the roof of the locomotive (top right), running down the corner and under the floor of the engineer's cab.

length. It is made of 16-gage steel, and is coated with a hard baked-enamel protective finish. It is secured in place by hangers which, in turn, are welded or bolted to the locomotive and by bolting to the major pieces of apparatus which in turn are fastened to the locomotive body. It is also secured by bolting through the clamps which hold the sections together. These clamps are hinged at one side and bolted on the other and permit the duct to be mounted snug against both wall and roof.

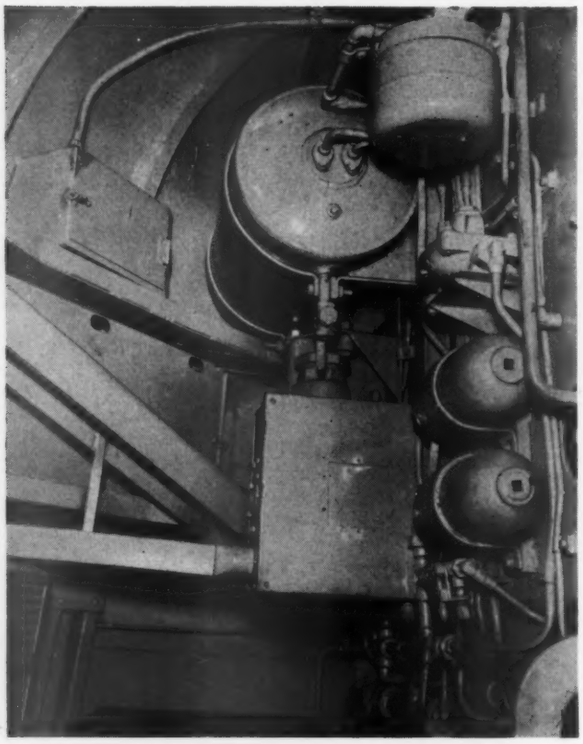
The wire in the duct is readily accessible and since it is mounted well above the floor, it is away from any accumulation of dirt, oil and water and the various types of cleaning agents used to clean the interior of the locomotive. The hinged cover makes it possible to wipe the wires and interior of the duct, and since it is self-ventilated, moisture which may be formed by condensation will dry out.

The Wirewa is run directly from the high-voltage cabinet to the traction motor field shunt resistor assembly. Connections to various pieces of equipment such as the generator shunt field and load regulators are made through conduit nipples. Air compressor synchronization equipment, signal warning lights, engine control and instrument panel, engine shutdown switch box, engine temperature control switch box, etc., are mounted tight against the underside of the Wirewa and fastened with a chase nipple. All lights, other than those in the cab, consist of vaporproof fixtures mounted directly on the bottom of the duct with a chase nipple. Openings for conduit connections are made with a knockout punch.

A smaller duct, called 1700 Surface Duct, is used to carry circuits from the engine control panel respectively to the engine temperature switch and the governor. It is also used to carry circuits in the nose of the locomotive



A run of Wirewa alongside an engine showing mounting of lights.



An application of the 1700 Surface Duct (lower left), which carries circuits to headlights, marker lights, classification lights, dynamic brake selector resistors, engine instrument panel lights, and train control leads.

where the smaller number of wires does not warrant the use of the large Wirewa. The Surface Duct is used to carry circuits from the engine control panel respectively to the engine temperature switch and the governor. It is also used to carry circuits in the nose of the locomotive where the smaller number of wires does not warrant the use of the larger Wirewa. The Surface Duct measures 1⅝ in. by 2⅛ in. in section, is made of 19 gage steel, having a baked enamel finish, and is fitted with a snap-on cover.

All the new wire and cable is run in the ducts except the main generator power leads to the high-voltage cabinet and the traction motor leads from the traction motors to the high-voltage cabinet. The main generator leads are run in a trough underneath the floor. This corresponds to the manner in which the locomotives were wired originally. The generator field and generator starting leads are brought out near the top of the generator and carried overhead to the duct.

Before wires are laid in, both ends of each conductor are marked with metal tags bearing the same number. When the ends are cut to the exact length, the terminals are applied and the number tags are slipped back inside the terminal and refastened.

Compression type terminals are used on all sizes of wire and cable. Motor-driven hydraulic tools are used to apply the larger sizes and hand tools for smaller size conductors. Self-sealing neoprene tape is used at all locations where cables are exposed to oil, as in the generator sump. Plastic type tape, with and without adhesive back is used to make harnesses of wires in cabinets and at terminal boards. As the wiring procedure is further developed, harnesses will be made up in the shop and then put into the duct without need of fishing and pulling.

Neoprene sleeves are used on traction motor lead connectors. The sleeves are secured in metal clamps.

Paste for String Bands and Calking

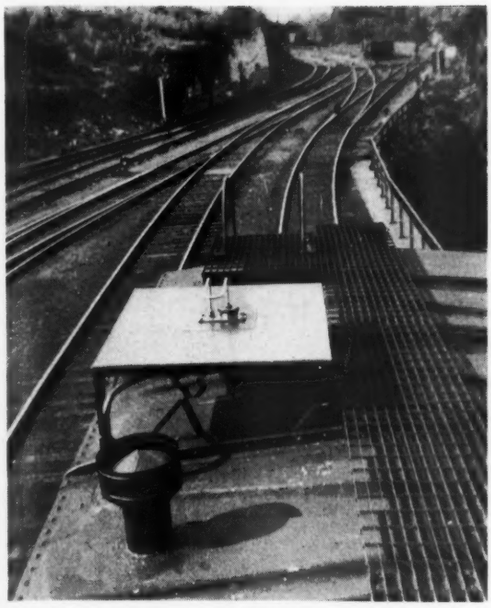
At least three railroads are now using Silastic Paste for insulating the string bands on the V-ring extension of diesel locomotive traction motors and generators. Adequate insulation of this area under operating conditions is considered to be an important preventive of flashovers. In addition to its application to string bands, this rubber-like silicone material is used behind commutator risers, under coil lead connections to the risers, around cross-connector leads where they are located behind commutator risers, between connection clips on armature coils at the pinion end of the armature and in areas around the commutator where there are relatively short, creepage distances between non-insulated metal parts operating at a difference in potential.

It is common practice to do this filling and calking with a varnish or resin which may or may not have been filled with some inert filler material such as asbestos or silica flour. Such a mixture of materials may have an initial flexibility, but as it ages from the heat of operation, it may become brittle and eventually crack and be thrown off the armature.

Silastic, the silicone rubber, has a considerable amount of flexibility or resilience and retains this mechanical property even after long periods of aging at high temperature. This material also has good electrical properties, low moisture absorption, high arc resistance and a non-tacky surface. It does not shrink and has high resistance to heat.

Three different pastes are recommended for different applications. These are Silastic 122, 123 and 125. The only difference between them is the consistency. Silastic 122 is like a heavy putty, the 125 paste might be described as having the consistency of soda fountain marshmallow, and the 123 paste is somewhere between these two. All three are used for calking d.c. armatures.

One railroad which has had a considerable amount of trouble with flashovers is using Silastic Paste 125 on string bands. The procedure is to first lay down a mica glass tape in the bottom of the area and over this apply the Silastic paste with a putty knife. A string band is then wound in the paste and during this winding the excess paste squeezes out between the turns of the turns of the winding. The armature is then rotated slowly and the putty knife is held against the slot to remove excess material and smooth off the surface of the paste. The Silastic is then cured before any varnish treating is done on the armature. On this railroad, the curing consists of baking for four hours at 150 deg. C. and two hours at 200 deg. C. The manufacturer of Silastic states that it should be possible to do this curing with a single bake. A second railroad is using the 122 paste and is curing by baking for four hours at 200 deg. C. A third railroad uses the 123 paste, and bakes for six hours at 150 deg. C.



The Story of Direct Mechanical Drive for Caboose Generators

Development of the seemingly simple mechanical axle drive for cabooses and baggage cars actually entailed difficulties which should be known to the user

By W. S. H. Hamilton
Engineer, Electrical Equipment
New York Central

THE NEW YORK CENTRAL was one of the first railroads to adopt the present well-known Spicer drive for generators on mainline passenger cars. Beginning with an experimental application of three such drives in October 1935, it has extended the application to the present time when it has an approximate total of 1,200 drives on New York Central cars and 350 New York Central-owned Pullman sleeping cars. These drives are all of the size and type suitable for driving 20- or 30-kw. generators.

General Requirements Of This Type of Drive

During World War II, when developmental work was difficult, if not impossible, thought was given to the items that might be needed in the post-war period. Realizing that radio equipment on cabooses was well on its way toward extensive use. This was one of the items that was placed on the agenda for discussion and development after the war. It was recognized, after some consideration had been given to the problem, that it would be highly desirable to have a mechanically-driven generator rather than to rely on the use of belts, particularly as cabooses are subject to heavy shocks, and have to operate around very sharp curves. Con-

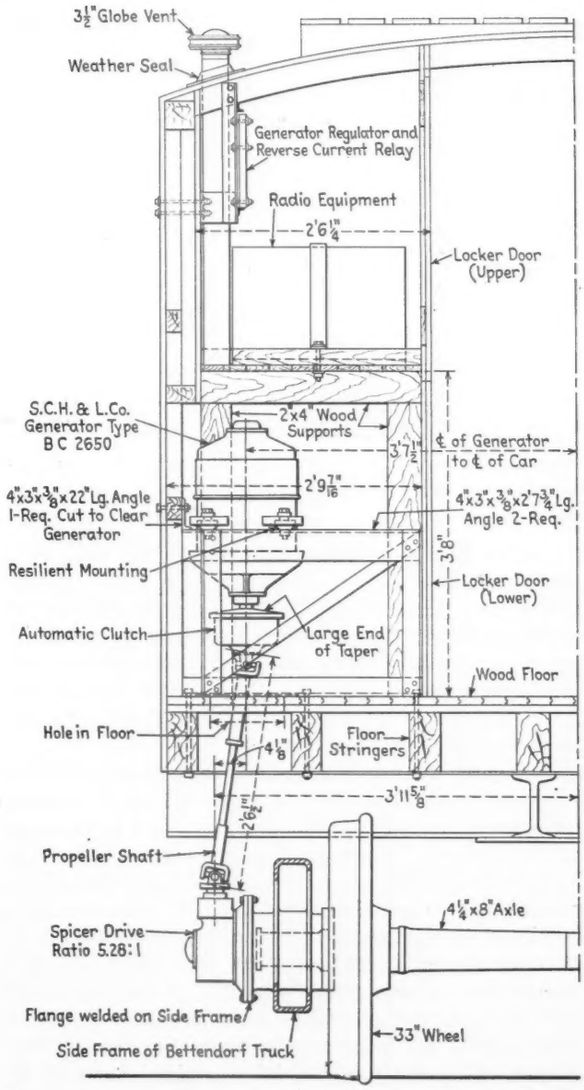


Fig. 1—General arrangement of the vertical drive, including the generator and radio equipment.

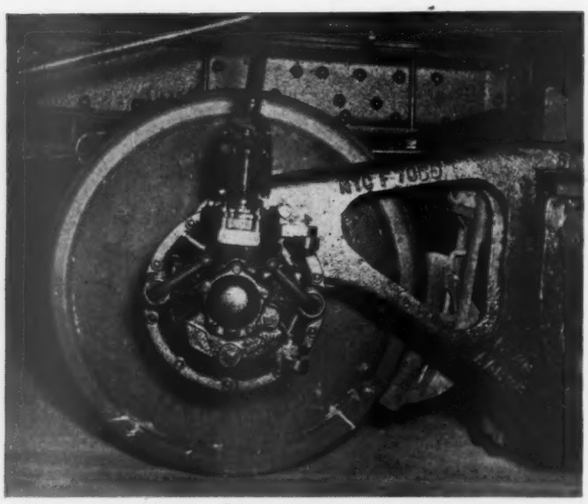


Fig. 2—The gear drive which was installed on Caboose No. 17498, January 1947.

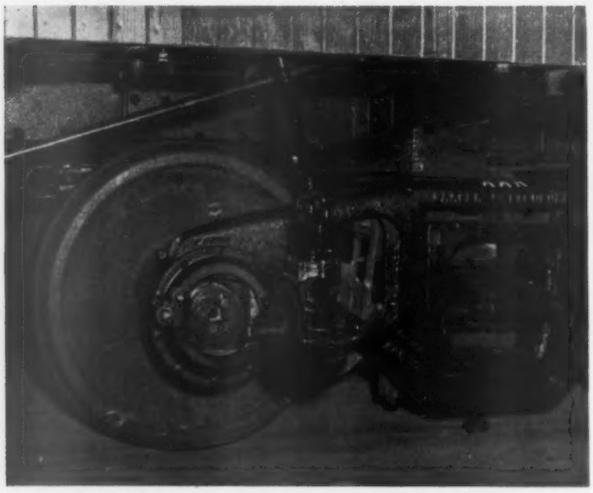


Fig. 3—The drive shown in Fig. 2, swung out to permit packing and oiling the journal.

sideration of the problem of shaft angles on curves, developed that the best solution was a drive mounted at one end of a car axle driving a vertically-mounted generator above it, mounted inside the car body. Driving generators from the ends of car axles is fairly common in Europe, but in 1945 it had not been done in this country, nor had a vertical drive been used anywhere so far as is known.

In March 1945, the Spicer Manufacturing Division of Dana Corporation, Toledo, Ohio was asked to undertake the development of a drive that could be mounted at the end of a non-roller bearing axle on a caboose and drive a vertical generator mounted inside the caboose through a vertical propeller shaft. At that time, the decision had been made that all radio equipment was to be operated from 110 volts, a.c., 60 cycles, and this necessitated allowance for losses in conversion equipment between the generator and the radio equipment. After taking this into account, it was felt that a 2-kw., 40-volt, d.c. generator should be provided and that the drive should be capable of driving such a generator.

To secure the low cut-in and full load operating speeds

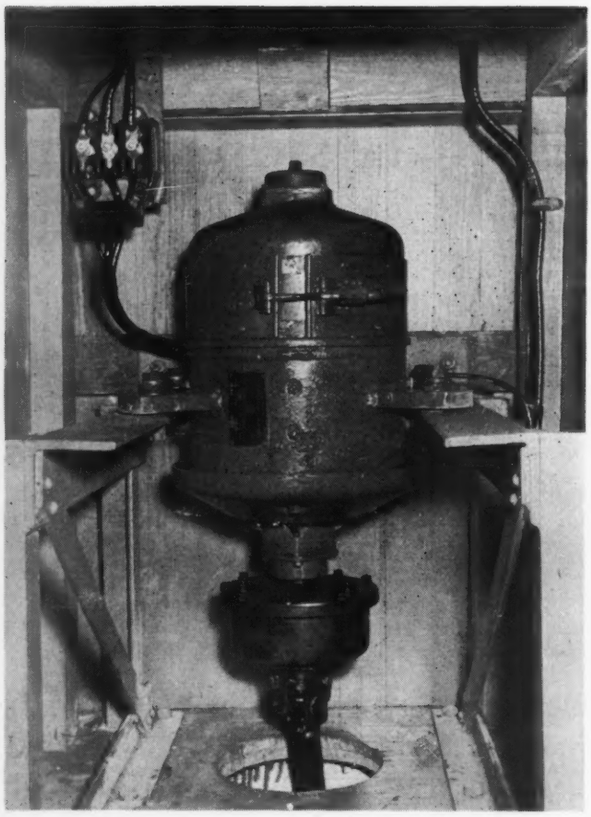


Fig. 4—The 2-kw. Safety generator used with the original drive.

required in freight service, it was determined that a 5.28 to 1 ratio between the axle and the generator driving shaft should be used. The Spicer Manufacturing Division developed a drive on this basis; and the Safety Car Heating and Lighting Company developed a type BC-2650 generator vertically mounted and rated it to deliver 2 kw., 40 volts at 650 r.p.m. When installed on a caboose with 33-in. wheels, this generator has a cut-in speed of 10.5 m.p.h. and a full load speed of 12 m.p.h. The generator was designed for a maximum speed of 4,200 r.p.m. to permit operation at a maximum speed of 75 m.p.h., which was assumed to be the maximum speed required in freight service.

First Application

During the time that the developmental work on the generator and drive was taking place, it was decided to install radios on 10 cabooses operating on the Big Four section of the New York Central System, between Springfield, Ohio and Indianapolis, Ind. This is a double track line handling mostly freight and having a maximum speed limit for freight trains of 35 m.p.h. On account of time requirements, it was decided to install belt-driven generators using a flat belt, a 19-in diameter axle pulley, a 7-in. diameter armature pulley, a safety type 15425 generator rated 1.5 kw. at 40 volts, d.c., on 9 of these cabooses. The tenth caboose was arranged to receive a Spicer vertical drive and the installation was made on this caboose No. 17498, which was outshopped from Beech Grove shops on January 8, 1947.

Figure 1 shows the general arrangement of the drive,

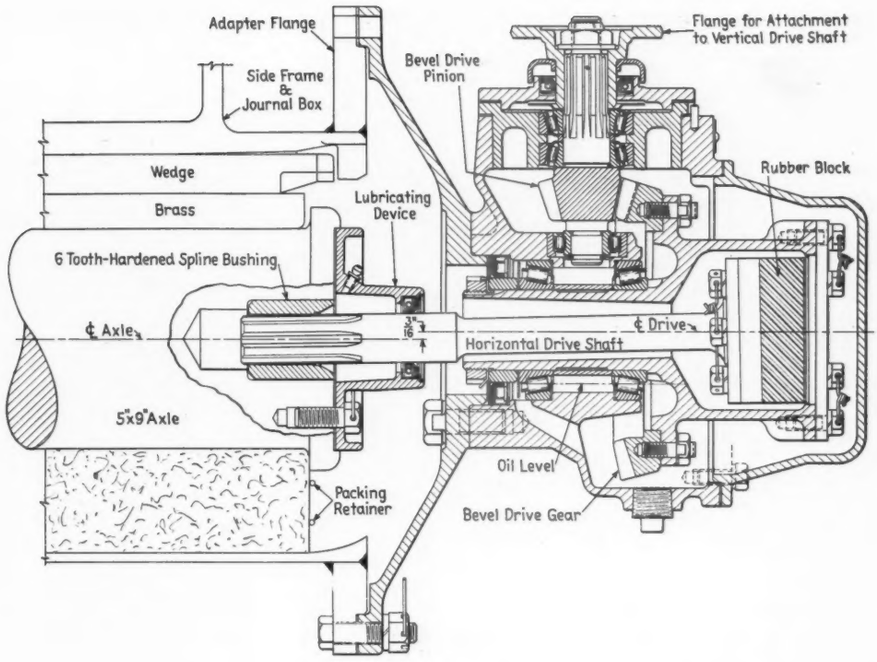
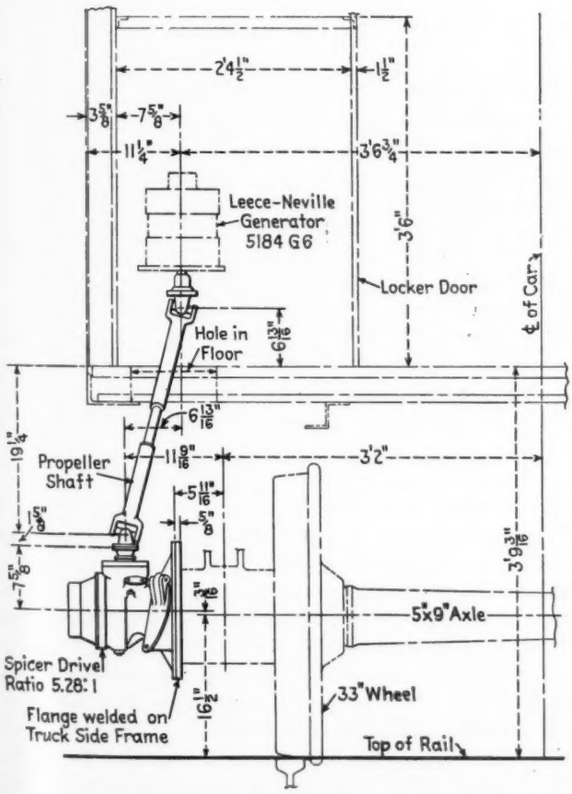


Fig. 5 (right)—Cross-section of present vertical drive showing horizontal drive shaft and rubber at outer end, including lubrication device at inner end.

Fig. 6 (below)—Arrangement of the drive shown in Fig. 5 as applied to a caboose.



generator and radio equipment, etc., on this caboose. The generator is entirely enclosed but is arranged with an external fan at the lower end, which blows air over the surface of the generator and expels it through a duct ending in a 3½ in. Globe ventilator above the roof of the caboose.

The drive itself is shown in Fig. 2. Inasmuch as it is necessary with the ordinary non-roller bearing box to have access to the waste for packing and oiling, the drive was arranged with cam actuated handles so that it could be swung away from the axle and expose the end of the box as shown in Fig. 3. The driving shaft connecting the axle with the drive was arranged with square rounded ends so as to engage in a depression in a piece bolted onto the end of the axle as shown in Fig. 3. This driving shaft engaged in a corresponding member within the drive itself and was held in position by a spring at the outer end of the drive.

Figure 4 shows the Safety 2-Kw. vertically mounted generator with an automatic clutch installed at the lower end of the generator shaft and connecting to the upper end of the drive shaft. It supplies power to an Aerion radio transmitter and receiver which operates directly on 32 volts. The caboose was also equipped with a 16-cell, lead-acid storage battery of 136 amp.-hr. capacity, mounted in a box underneath the floor

Problems To Be Overcome

It was realized when first undertaking the design of this type of drive that the conditions to be met would be severe, due to the vibration of the parts mounted directly on the truck side frame (or journal box), the vertical displacement due to wear in the journal brass and the transverse movement of the axle. All of these difficulties together with some others that had not been anticipated, were experienced in full degree in this first application.

It was found that at a speed of approximately 60 m.p.h. when going over a crossover that the vibration was severe enough to jar the horizontal drive shaft out of contact with the end of the axle, requiring the tension in the springs operating the cams controlled by the handles to be increased.

The caboose was placed in service with this drive February 7, 1947, and has been in operation most of the time since then. It finally became necessary on this particular drive to remove the handles and bolt the

Fig. 7—The present drive with packing doors closed.

Fig. 8—When the packing doors are opened, the journal can be packed and oiled as readily as a standard box.

drive in position on the truck frame. This was permissible on this particular run where the maximum speed was low and the caboose received careful attention. It was realized, however, that this original design would not be satisfactory for general application.

First Application To Passenger and Baggage Car

At the same time that application of the first design of drive was made to the caboose, an application was also made to passenger-baggage car No. 127, for the purpose of obtaining an accelerated life test. This car was outshopped from West Albany shop on February 5, 1947. A general discription of the application is given in the September 1947 issue of *Railway Mechanical Engineer*, page 484.

This passenger-baggage car was placed in service on trains operating between New York and Buffalo, where high speed occurs on the Mohawk and Syracuse Divisions. The desired result of the accelerated life test was obtained. It was first found necessary to wire the two handles that held the drive in the closed position together, to keep the drive from opening up en route, and then a succession of badly worn horizontal drive shafts was encountered. Finally, it was found necessary to replace the handles with bolts as had been done on the Springfield Division caboose, and shortly afterward the drive was badly damaged by striking something during a heavy snow storm and had to be removed from the car.

Evaluation of Results Obtained

It was concluded from these trials that it was not worth while continuing tests with a drive of this first design, especially in high speed service. It was decided that for any future applications to non-roller bearing boxes, it would be necessary to have a drive which could be mounted rigidly on the journal box or truck frame, but which would have doors on it for access for packing and lubricating the waste.

Considerable time and effort were required to redesign the drive to meet the above requirements, and it was not until April 1950 that a design was worked out which it was felt might be satisfactory. A wooden model of this drive was made up with doors on it to show the space available for access to the waste. This model was reviewed not only by those interested in the drive itself, but also those interested in maintenance of journal boxes on the railroad. After examination of this wooden model, it was decided that the design was satisfactory to proceed with.

Application to Cabooses

In the meantime request had been received to equip two cabooses for use on the run between the Benson Mines, Watertown and Syracuse, N. Y. These cabooses are conventional modern steel cabooses having bay windows instead of cupolas.

By this time, the radio manufacturing companies had decided that it was not necessary to have 110 volts, a.c., 60 cycles for operation of the radio equipment, and that it could be designed for operation from 12 volts, d.c. This lowered the requirements of the generator from 2 kw., 40 volts, d.c. to 1 kw., 14 volts d.c.

The drive shown in cross section in Fig. 5 was applied to the cabooses as shown in Fig. 6, this showing a cross section of the drive application. While the drive is still rated at 3 kw. capacity, the generator selected was a Leece-Neville 5184G6 type, which is an a.c. generator with rectifiers for conversion to the rated output of 75 amp. at 14 volts, d.c. Because of the small size of generator, it was decided that a clutch was unnecessary.

In an effort to overcome shocks on the horizontal driv-

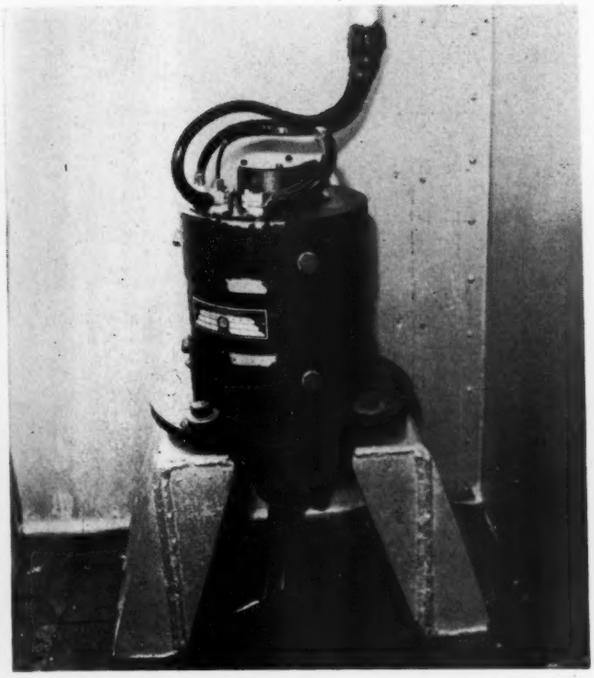


Fig. 9—The Leece-Neville generator as mounted in the caboose.

ing shaft, this drive includes a block of rubber at the outer end through which it couples to the axle by a fairly long shaft having a splined end at the inner end, fitting into a hardened steel bushing in the axle having the same external dimensions as the standard A.A.R. six-tooth car axle splined bushing. The application of the drive is shown in Figs. 7 and 8. Figure 8 shows it with the doors opened for access to the waste.

Figure 9 shows the generator in place with shaft connected to it. The rectifiers are ventilated by convection through openings in the bottom of the locker door and through a duct leading to the roof of the caboose and terminating in a 3½-in. Globe ventilator above the roof. A frequency of 161.07 mc. is used for transmitting and the same frequency is used for receiving.

Caboose 20200 is equipped with 6-cell, 178 amp.-hr. capacity, bus type batteries, mounted in a battery box underneath the floor, while caboose 20201 is equipped with a 6-cell, 280-amp.-hr. capacity lead-acid battery, the cells being of the same type as those used on diesel switching locomotives. The battery is mounted in a similar manner to that on caboose 20200. The purpose of trying these two types of batteries is to establish a comparison of life between them.

These cabooses were placed in service early in August, 1952, and have run about 28,600 miles each to April 1, 1953. The original splined bushings in the ends of the axles showed signs of wear soon after the cabooses were placed in service and as a consequence, the splined bushings in the axles on both cabooses were changed to hardened steel ones to reduce the wear. It was found, however, that wear continued to accumulate, and to counteract it, a lubricating fitting by means of which lubrication could be introduced back of the inner end of the splined driving shaft as shown in Fig. 5 was applied, which so far, has shown excellent results in lubricating the spline teeth.

Re-application of Drive to Passenger and Baggage Car No. 127

For the purpose of obtaining accelerated life test information on this new design of drive, an application was made to the passenger and baggage car No. 127, used in the tests with the original design of drive. The drive was placed in service on November 18, 1952 using a hardened steel splined bushing in the axle and the lubrication fitting for the drive shaft shown in Fig. 5. This car has operated approximately 19,300 miles to April 1, 1953, and the lubrication on the splined drive shaft has remained excellent, which seems to indicate that the major problems in the way of the application of this drive to a non-roller bearing box have at least been overcome.

As in the case of the previous application, this car is used in service between New York and Buffalo, where high speeds are encountered on the Mohawk and Syracuse Divisions. It has at times also operated from New York to Chicago.

The drive ratio is 3.7 to 1, instead of 5.28 to 1 as used on the cabooses, to compensate for the higher speeds encountered.

A drive of the new design was applied to caboose No. 17498, operating on the Springfield Division, about February 18, 1952. This drive differs from that shown in Fig. 5 in that a special splined adapter mounted on the end of the axle is used. This connects with a splined drive shaft, similar to, but shorter than, that of Fig. 5, but having the same rubber block at the outer end of the drive. Except for wear of the adapter and spline, performance of this drive has been satisfactory since application, and the mileage run to April 1, 1953 is approximately 42,800.

Application of Drive to Roller Bearing Journal Boxes on Baggage Cars

During the time that these developments were taking place, it was decided to try out the application of a somewhat similar drive to N.Y.C. baggage cars Nos. 9195 to 9199 inclusive. Inasmuch as these cars are equipped with Hyatt roller bearings, the problem was much simpler, insofar as the drive was concerned, than the application to the non-roller bearing boxes.

Application of these drives was made between February 1, 1950 and December 18, 1951. Figure 10 shows a general view of the application of the generator and drive, and Fig. 11, the general arrangement. A horizontal drive shaft splined at both ends is used between a splined bushing in the end of the axle and similar spline teeth in the drive itself. This drive shaft has a rubber insert that takes up torsional shocks. It has also been found that these is just enough lubrication coming over the end of the axle to lubricate the spline teeth at the axle end of the drive shaft, so that no trouble has been experienced with wear of spline teeth in either axle bushing or drive shaft.

The drives are mounted on the bosses provided on the Hyatt adapter cover which is customarily used for mounting Decelostats.

The generator is a Safety 1.5 kw. type B-15425. A standard reverse current relay is provided to connect the generator to the battery, which is a 25-cell, 170 amp.-hr. capacity Edison Battery, type A4HW.

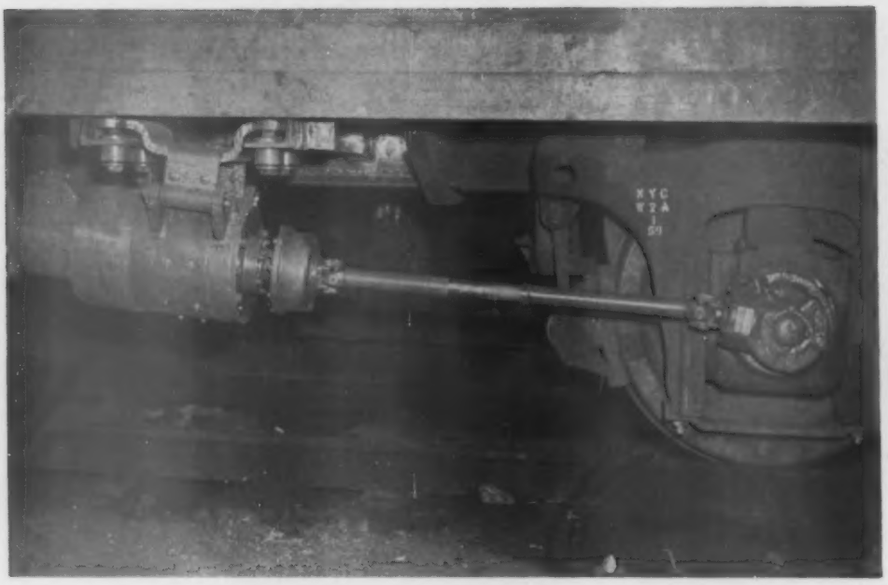
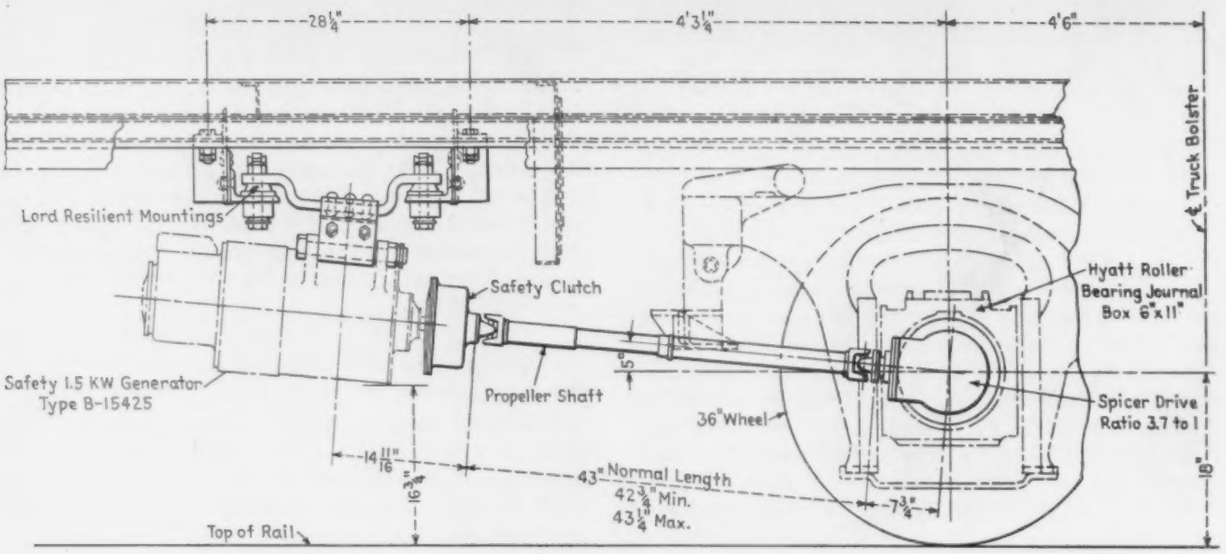


Fig. 10 (left)—The drive as used on a baggage car with a roller bearing journal and horizontal shaft for driving 1.5-kw. Safety generator.

Fig. 11 (below)—General arrangement of the drive shown in Fig. 10.



It will be noted from Fig. 11 that a clutch is used between the generator and the propeller shaft. This is of the Safety type rather than the automatic type which had previously been used.

The only difficulty experienced with these drives has been lack of area on the bosses provided for the Decelostat mounting to keep the drives from rotating back and forth and wearing the cap screws which hold them in position. Recently, arrangements have been made to secure a different mounting part and to increase the diameter of the mounting flange of the drive itself, also to provide larger diameter studs to fasten the drive onto the mounting part. This new mounting part will provide greater frictional area against rotation due to torsional shocks.

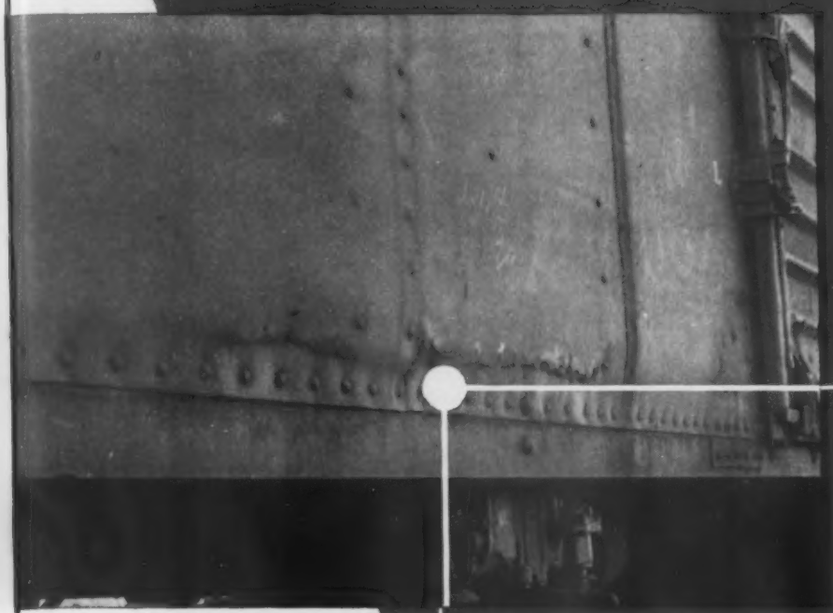
Other than this difficulty, the drives have performed very well, and the accumulated mileage on all five drives since they were placed in service, to April 1, 1953, is approximately 1,581,000 miles or an average of 316,200 miles each. It is believed that with the changes in the adapter block for fastening the drive to the Hyatt bearing, the last difficulty in the operation of this type of drive will have been overcome.

All of the drives described above are lubricated with Elco 28 Grade E oil in the gear cases of the drives and Elco 250 oil is used for lubricating the splined shafts and propeller shafts.

No wear has even been found in the gear teeth, bearings or other parts of the drive proper, even when mounted on non-roller bearing boxes.

Sincere appreciation of the work done by the Spicer Manufacturing Division of Dana Corporation and especially of the personal interest of Mr. P. R. Lewis, now executive engineer of that company, for his continued interest and efforts over such a long period of time is gratefully made.

The author can add that for a relatively small problem, this has been the hardest one to solve of all those he has been in contact with during his 40 years of experience in the railroad field.



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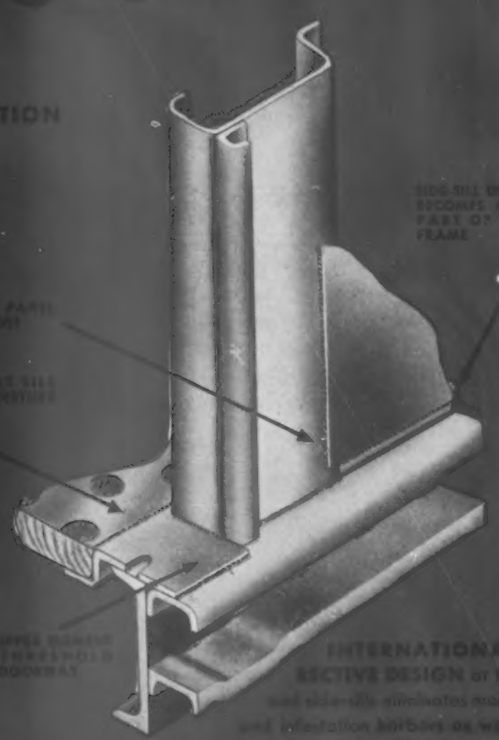
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Questions and Answers

Diesel-Electric Locomotives*

Circuit Analysis (Continued)

794-Q.—How is the fan at this time?

A.—Resistance in the clutch field circuit is now so great that the minimum current will all but stop fan rotation.

795-Q.—How are the circuits at this time and what are the resulting conditions?

A.—The circuits are now as they were shown on Fig. 2. The shutters are closed, the fan is stopped and no cooling action is taking place.

796-Q.—What may occur during conditions of very high temperature?

A.—The rheostat motor may drive the rheostat arm all the way around to minimum resistance position.

797-Q.—What will minimum resistance position allow?

A.—This position will allow maximum fan speed.

798-Q.—What is the action to prevent the motor from further turning after this position is reached?

A.—Contact *I3* will be opened by a cam to de-energize the motor.

799-Q.—What develops as *TC* contact first touches either contacts *J* or *C*?

A.—An arc develops between *TC* and whichever con tact it is moving toward.

800-Q.—What will be the result?

A.—The arc will burn the contacts if not properly quenched.

801-Q.—What arrangement is provided to overcome this trouble?

A.—The coil *TC* just to the left of *TC* contact, will receive a current flow under these conditions.

802-Q.—Explain the operation further.

A.—The magnetic attraction set up by this coil will pull either the *C* or *J* contact (whichever one is involved in the arcing) against contact *TC*. This effectively quenches the arc.

803-Q.—How much can *J* or *C move* to accomplish the purpose?

A.—From .015-in. to .025-in.

804-Q.—What are the conditions when switch *S* is in *Manual* (open position)?

A.—The rheostat motor circuits will not operate.

805-Q.—How may the necessary fan speed be obtained with the S switch in open position?

A.—The rheostat arm can be turned manually to obtain the necessary fan speed. A knurled disc which protrudes through the front of the relay panel can be turned manually to operate the rheostat.

806-Q.—What are the conditions when switch S is in *Automatic* (closed position)?

A.—In this position the relay automatically controls fan speed.

Radiators

807-Q.—How is water cooling provided for on each diesel engine?

A.—Each diesel engine is provided with two radiator panels for jacket water cooling.

808-Q.—What does a radiator panel consist of?

A.—A radiator panel consists of core sections bolted together between support flanges and fitted with water headers bolted at each end.

809-Q.—How are headers connected to water system?

A.—A threaded water connection is provided in each header for connecting to the water system.

810-Q.—Describe the radiator tubes.

A.—The tubes are of a thin rectangular cross section and are fitted through continuous fins extending across the core assembly.

811-Q.—How is the assembly supported?

A.—The headers, back up frames and/or filler frames form supporting members of complete assembly.

812-Q.—What does the engine base provide?

A.—A mounting surface for the free end casing, generator adaptor, cylinder block, and two of the four engine mounting pads, a housing for the under side of the cylinder block and the main lube oil header.

813-Q.—In addition, in what other capacity does the engine base perform?

A.—It acts as a lubricating oil reservoir.

814-Q.—What do the side doors provide access to?

A.—The split gear, main and connecting rod bearings, connecting rods, lube oil lines and a means of inspecting the cylinder liners and piston skirts.

815-Q.—What is the procedure for dismantling?

A.—1—Remove block assembly from base. 2—Remove lube oil drain plug. 3—Remove lube oil header. 4—Remove the sump screens.

816-Q.—After dismantling, what should be done?

A.—Thoroughly clean and inspect interior and exterior.

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives. The figure numbers and references, by number, to diagrams, etc., relate to the current edition of the Alco-G.E. operating and maintenance manual.

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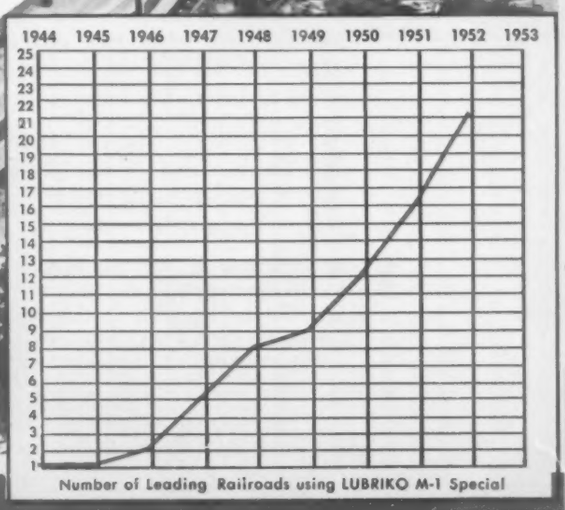

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Schedule 24 RL
Air Brakes

SC-2-A Circuit Checking Equipment-Electro-Pneumatic Brake

1567-Q.—What is the purpose of the *SC-2-A* Circuit Checking Equipment?
A.—To provide a method of indicating to the engineman the condition of the electro-pneumatic brake circuits on the train.

1568-Q.—When is this indication provided?
A.—Visual indication is provided, as to the condition of the electro-pneumatic brake circuits, both during the time the brakes are released while running along the road and at the time a brake application is effective.

1569-Q.—What happens in the event that a circuit fault visual indication is ignored?
A.—A full automatic brake application occurs when an electro-pneumatic brake application is attempted if the circuit fault visual indication is ignored.

1570-Q.—What is the indication if the brake circuits are in working order?
A.—During release the circuit checking equipment white light indicates that the brake circuits are in working order.

1571-Q.—What is the indication if the circuit is at fault?
A.—During release the circuit checking equipment red light indicates a circuit fault.

1572-Q.—What should be done if the white light indication turns to red?
A.—When the white light indication turns to red, the engineman should immediately shift the brake valve shifter lever from electro-pneumatic to automatic brake position unless his operating instructions dictate otherwise.

1573-Q.—If engineman fails to do so, what is the result?
A.—It would result in a full automatic brake application when the electro-pneumatic brake is applied.

1574-Q.—What does the electrical portion of the electro-pneumatic brake consist of?
A.—The electrical portion of the electro-pneumatic brake consists of magnet valves on each car connected by train line wires and controlled by contacts in the master controller.

1575-Q.—Describe the electrical circuits briefly.
A.—The application magnets form one circuit, the release magnets another circuit, and a common return being used for both.

1576-Q.—Upon what does the proper functioning of the electro-pneumatic brake depend?
A.—On the integrity of the application and release circuits with their common return.

1577-Q.—How is this circuit integrity checked?
A.—Checked and indicated to the engineman by the *SC-2-A* Circuit Checking Equipment.

1578-Q.—What is the basis of this equipment?
A.—The Wheatstone Bridge.

1579-Q.—In what way is the equipment used?
A.—To measure the resistance of the application and release circuits, including the magnet valves, and to detect any change in resistance.

1580-Q.—On what train lengths can be Wheatstone bridge of the equipment be balanced?
A.—For any length of train not exceeding twenty-four vehicles (combined cars and locomotive units) and thereafter can detect a change in resistance such as may occur due to faulty connections between cars.

Description of the Parts
64-SC-2 Relay Cabinet

1581-Q.—What is contained in the *64-SC-2* relay cabinet?
A.—This cabinet, Figs. 1 to 4, contains the resistors, relays, condensers, etc., necessary for the operation of the circuit checking equipment.

1582-Q.—What does panel of relay cabinet contain?
A.—Two indicating lights and the necessary switches to place equipment in operation, as well as the meters and calibrated dials used to initially balance the bridges.

1583-Q.—What does the name plate on the panel contain?
A.—Contains equipment operating instructions.

Indicating Light Panel

1584-Q.—What is function of indicating light panel?
A.—The indicating light panel, Fig. 5, placed in view of the engineman, indicates the condition of the electro-pneumatic brake circuits of the train.

1585-Q.—How many lights in the indicating light panel?
A.—Two panel lights, the same as the two on the relay cabinet panel.

1586-Q.—Is the intensity of the white light adjustable?
A.—Yes. By turning the lens, so that a bright indication can be used in the day time, with a dimmer indication for night use.

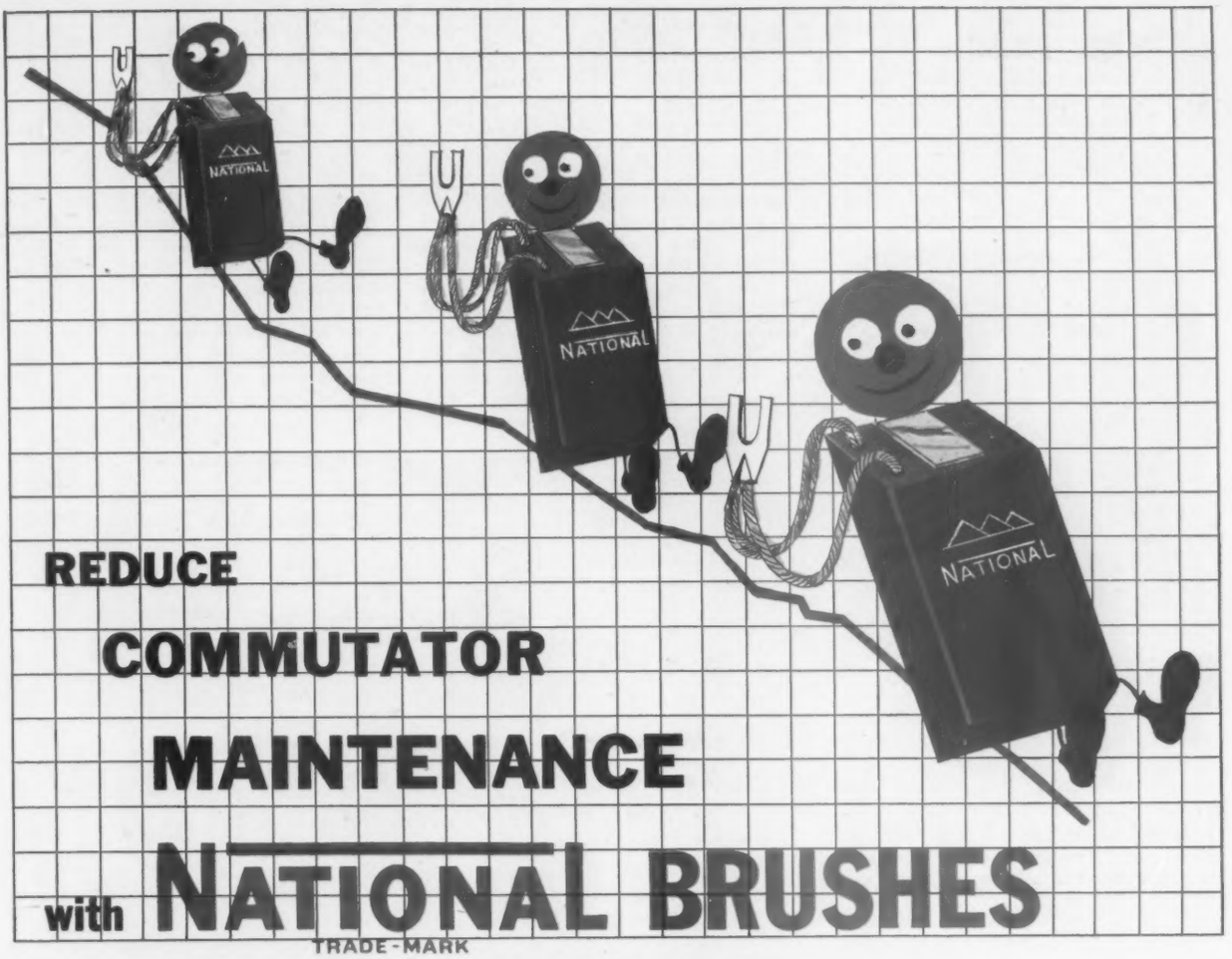
Temperature Compensating Unit

1587-Q.—Where is temperature compensating unit located?
A.—Outside of the locomotive where the temperature is approximately the same as that around the magnet valve coils on the train.

1588-Q.—What does this unit contain?
A.—Two coils in a weather tight box.

1589-Q.—In what manner are these coils related to the electrical installation?
A.—The coils of this unit are part of one arm of each Wheatstone Bridge.

1590-Q.—How does the Temperature Compensating Unit function?
A.—The change in resistance due to temperature changes compensates for the change in the magnet valve resistances in the train which is also due to temperature change.



REDUCE COMMUTATOR MAINTENANCE with NATIONAL BRUSHES

TRADE-MARK

for Diesel-Electric MAIN GENERATORS

Here's punishment for you!

- **100 AMPERES PER SQUARE INCH!...**
- **90 MILES PER HOUR!...**
- **SEVERE VIBRATION AND SHOCK!...**
- **NO LUBRICATION!...**

That's the everyday set of rules for main-generator brush operation. Satisfactory service under these conditions is made possible by a very significant, microscopic *film* on the commutator surface. When this film is *right,* it protects the commutator against excessive wear, sparking, dragging, bar-burning — and adds long life to the brush. When it's *wrong* — you've seen the bills for commutator maintenance!

One big reason why more "National" main-generator brushes are used than all other makes combined is their ability to lay down and maintain a commutator film that results in trouble-free service and less frequent commutator maintenance.

For years, NATIONAL CARBON engineers have been studying the phenomena which determine film formation. Even now, these continuing studies are paving the way for still greater maintenance economies in the future.

The term "National", the Three Pyramids device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
In Canada: National Carbon Limited, Montreal, Toronto, Winnipeg

NEW DEVICES

Steel Files for Rolled Maps

The Kraftbilt V-96 Vertical Rollfile, manufactured by the Ross-Martin Company, Tulsa, Okla., is an all-steel cabinet for storing rolled blueprints, tracings, drawings, and maps. The cabinet, measuring 23 in. wide, 29 in. deep and 62 in high, has 96 storage tubes. Letters and numbers on drawer ledges permit indexing of tubes, and ball bearings insure quiet, easy opening and closing even when fully loaded and under maximum extension. The door, which retracts into the cabinet body when opened, features a countersunk bronze handle and a tamper-proof lock. When closed it provides protection against fire, dust, dampness, rodents and insects. It is furnished in gray or olive green baked enamel with brushed bronze trim.

The V-56 Vertical Rollfile is a smaller unit which files 56 rolled maps, etc., 36 in. wide up to 54 in. wide.

The H-342 Horizontal Rollfile will accommodate 112 rolled maps, blueprints, tracings or drawings in 2-in. inside diameter tubes. The larger H-354 unit is 12 in. deeper for filing maps 54 in. inside 84 tubes, each 2⅜ in. in diameter. These horizontal files have disappearing doors, metal index plates and locks. Removable tops and bases permit adding sections from floor to ceiling.

■

Small Heavy-Duty Opposed-Piston Engine

A new small compact opposed-piston diesel engine for railroad and other specialized applications in the 225 to 750 hp. range has been announced by Fairbanks, Morse & Co., Chicago. The engine (Model 38F5¼) has a 5¼-in. bore, a 7¼-in. stroke and is rated at 75 hp. per cylinder at 1,200 r.p.m. It is designed for continuous heavy duty service despite the low weight, e.g. 7,100 lb. for the 225-hp. unit. Construction throughout is sturdy with conservative piston speed and bearing loads. A number of these new diesels, installed for field tests late last year, are now in regular service.

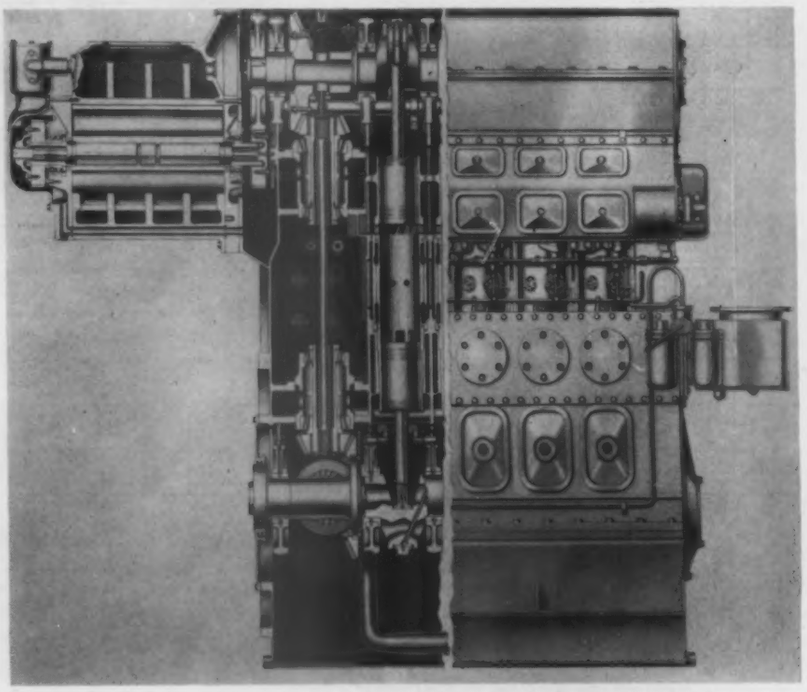
Development of the new engine stems from the growing success of the original 8⅛ in. by 10 in. opposed-piston diesel, of which there is about 5,000,000 hp. in service, including navy, railroad, civilian, marine and stationary installations. With the new smaller unit in production, Fairbanks-Morse is now able to offer OP's from 225 hp. to 2,400 hp., all of which can be equipped to operate as oil-burning diesels, as dual-fuels, or as spark ignition gas engines.

The crankshaft of the new engine is made from a high-strength cast iron alloy, cast with integral counterweights and cored for lightness to minimize main bearing loads. It is further balanced both statically and dynamically for vibration-free operation. A large thrust bearing is provided at the drive end of the engine.

The precision main bearings are machined from wear-resistant aluminum alloy for durability. To improve crankshaft and bearing alignment, the forged steel main bearing caps are mortised into the engine frame. When required, torsional dampers are attached to the crankshafts to eliminate critical speeds of torsional vibration. The vertical drive shaft turns in large tapered roller bearings. Torsional flexibility is provided by the flexible shaft design.

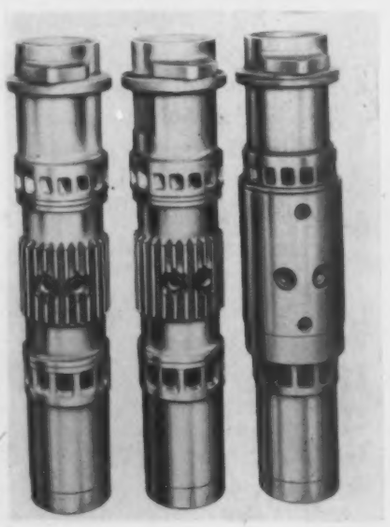
The liners are designed to provide both adequate cooling and rigidity of structure. Sturdy steel water jackets are fitted onto the liners around their middle or combustion area where they also support combustion forces. The cooling water flows through the fluted passages formed by the liner and the fitted water jacket. The upper part of the liner is cooled by scavenging air; the lower part, by the water which circulates through exhaust manifold housing.

(Continued on page 108)



Section of the Fairbanks, Morse 750-hp., Model 38F5-¼ diesel engine.

Below: Interchangeable cylinder liners are cast from high-tensile close-grained iron with steel water jackets fitted on the liners. Cooling water flows through the fluted passages formed by the liner and jacket.

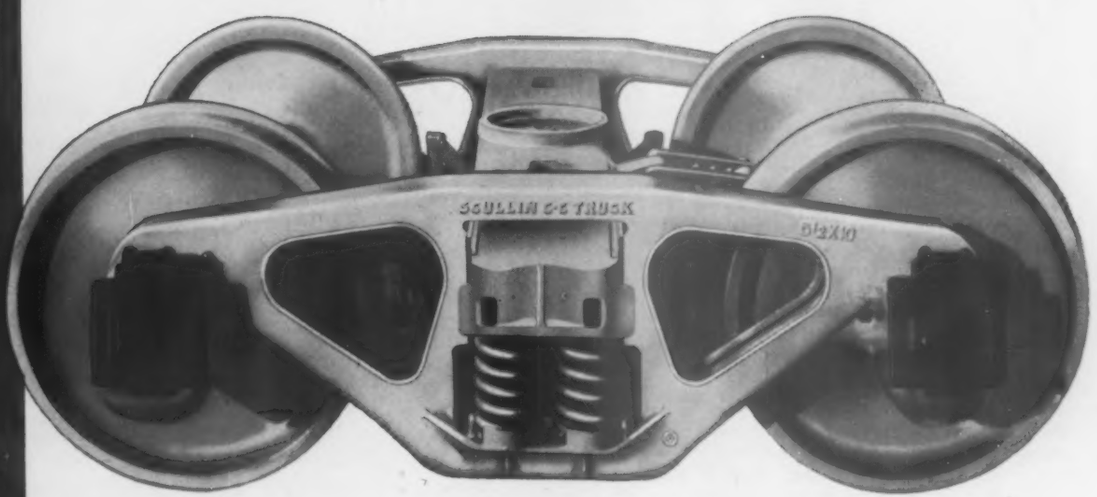


STOP at Booth G-1, Atlantic City Convention

See

THE *New*

SCULLIN CONSTANT C-C CONTROL TRUCK!



THE NEW *High Speed* FREIGHT CAR TRUCK YOU'VE BEEN WAITING FOR!

Before YOU SPECIFY ANY TRUCK . . .

See THE C-C !

STEEL CASTINGS MANUFACTURER

NEW YORK
CHICAGO
BALTIMORE
RICHMOND, VA

SCULLIN STEEL CO.

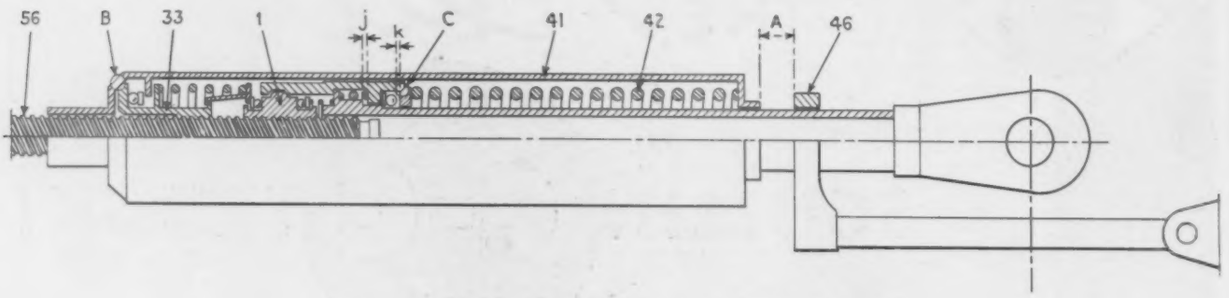
SAINT LOUIS 10 MISSOURI

The two pistons form a nearly spherical combustion chamber as they converge midway in each cylinder. Each piston is fitted with three compression rings at the closed end and three oil rings at the open end. Upper and lower pistons are completely interchangeable.

The scavenging air blower is of the positive displacement, rotary lobe type, and is driven through a flexible drive arrangement by the upper crankshaft. When operating the engine at part load, blower output is reduced by an air bypass valve which minimizes blower power requirements, and thereby lessens fuel consumption. The exhaust manifolds, one on each side of the engine, are water cooled and may be removed from the cylinder block. The exhaust manifolds have openings of ample size for exhaust port, piston and ring inspection. Thermocouples for indicating the exhaust temperatures of individual cylinders may be inserted in the manifold covers. A fitting at the forward end of the engine receives the exhaust gases from both manifolds and is flanged to permit piping to the silencer.

One lever controls the starting, running and stopping of the engine. Push-button control permits emergency stops.

■ ■ ■



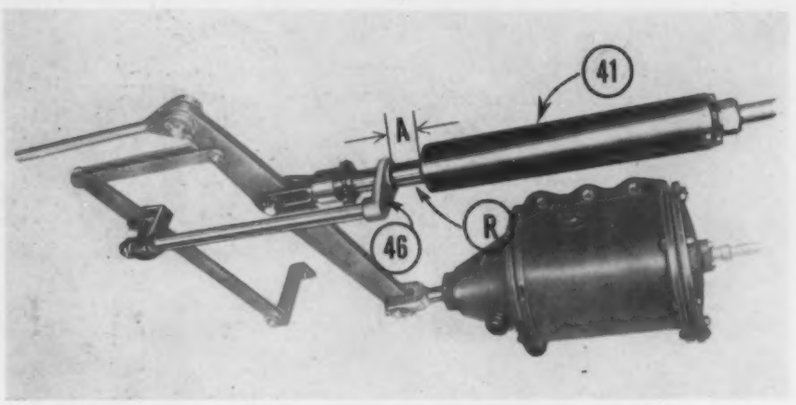
Elements of the American SAB Company's type DRV brake regulator

Double Acting Slack Adjuster

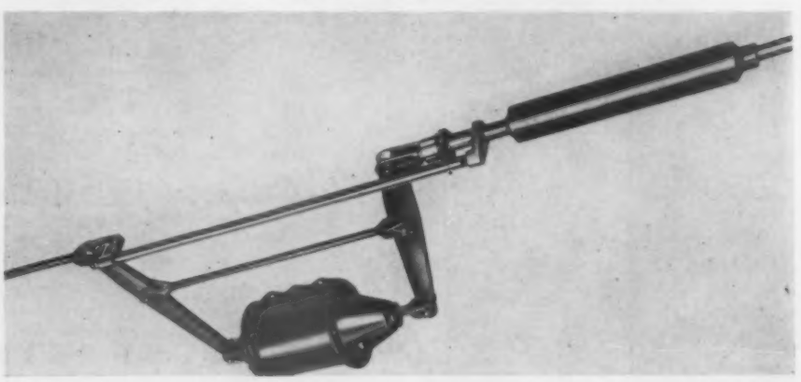
The American SAB Company of Chicago is offering the SAB type DRV double-acting brake regulator which is a slack adjuster that automatically takes up or pays out slack to keep brake shoe clearances constant. Installed permanently as a portion of the foundation brake rigging (becoming an integral part of the pull rod or the connecting rod depending on the type of installation), it regulates the part of the brake-cylinder piston stroke which corresponds to the slack in the rigging. Movements of the piston from elasticity in the brake rigging while under tension will not influence the adjustment.

The regulator is made double acting because clearances increase from brake shoe and wheel wear and decrease when brake shoes or wheels are renewed. It therefore guards continually against locked brakes arising from too short piston travel as well as from inadequate braking pressures that would result from excessive slack.

The basic principle of regulation can be seen from the installation picture. The end of the casing 41 contacts the abutment 46 at the same time the shoes contact the wheels when clearance between the two is correct. This clearance which the regulator is to maintain is equal to dimension A which is set permanently upon installation. If too much clearance exists, the casing contacts the abutment before the shoes contact the wheels. The casing cannot then move any further, and the rod is pulled into the casing until the shoes contact the wheels. The distance the rod was pulled into the casing indicates (and is equal to) the amount of excess slack. On release after the first brake application, the connecting rod or the pull rod is shortened accordingly, restoring proper brake shoe clearances. Paying out slack to compensate for too little clearance is similar, but two brake applications are required.



Installation of the regulator as a part of the brake rigging connecting rod



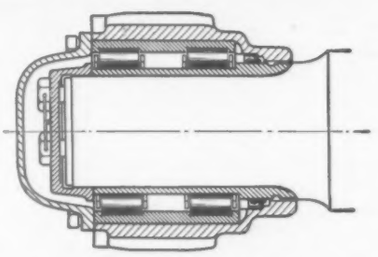
How the regulator is installed as part of a pull rod to control brake shoe clearance

The drawing shows the two major components of the regulator, the adjustable control rod and the casing with the following operating parts: Spindle 56, regulating nut 1, lead nut 33, two roller bearing clutches B and C, and a spring 42. The position of the regulating nut on the spindle (which is a reversible screw) determines the length of the regulator. The lead nut, by its movement on the spindle, registers the variation in total slack in the rigging and determines how much slack the regulator should take up or pay out. The two clutches lock the moving parts against rotation by means of the compression force in the main spring. Change in slack causes the lead nut to rotate in

(*Continued on page 114*)

Here's the first Bower-Franklin journal box

You are cordially invited to inspect the Bower-Franklin roller-bearing journal box which will be on exhibit in Space 3 and 4, Section I, in Convention Hall, Atlantic City. The box on exhibit will be of the pedestal type, with a cut-away section showing the bearing in operation.



Journal boxes for the Bower-Franklin freight-car roller bearing are now coming off the production line at Franklin Balmar's Baltimore, Maryland, plant. The housing is symmetrical with respect to the horizontal centerline, and can thus be turned 180° in case of wear. The housing completely surrounds the outer race of the bearing itself.

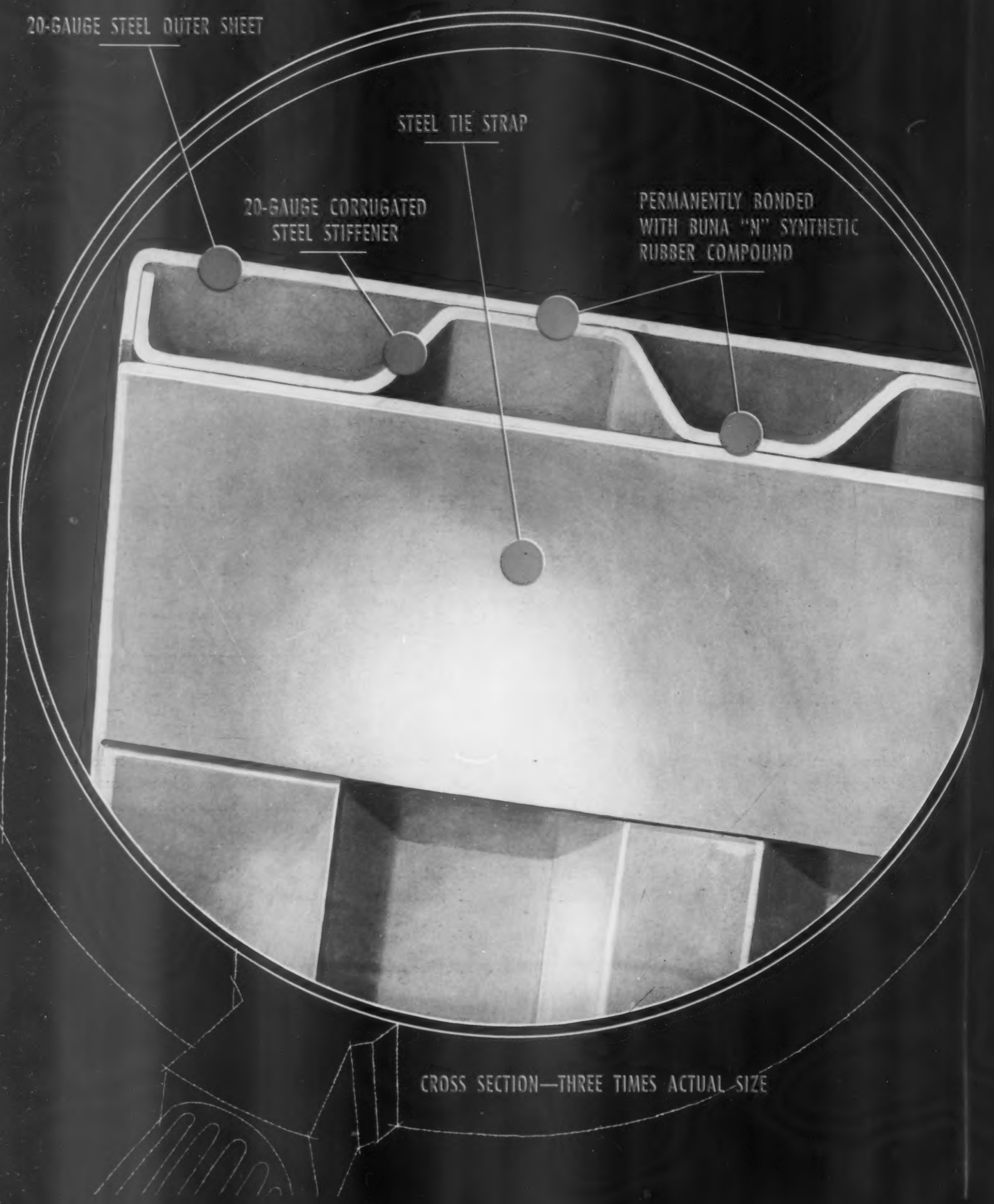
Roller bearings for this box are being produced by the Bower Roller Bearing Company of Detroit. These are of the straight type, with two rows of straight rolls running in single inner and outer races and are held in perfect alignment by a sturdy retainer.

Sales, service and application engineering are being handled by the Franklin Balmar Corporation. Additional information will be furnished on request.

FRANKLIN BALMAR CORPORATION

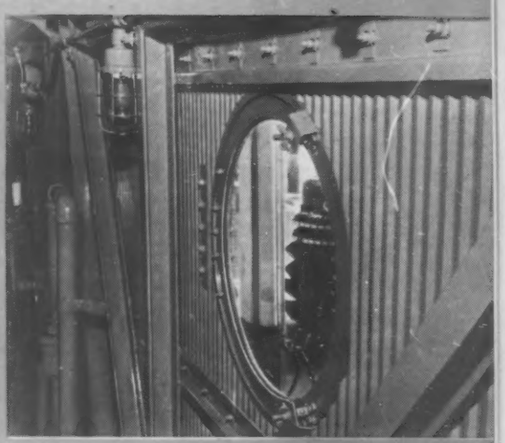
FRANKLIN BALMAR CORPORATION
WOODBERRY, BALTIMORE 11, MARYLAND
CHICAGO OFFICE: 5001 North Wolcott Ave., Chicago 40

NEW ALL-METAL PANELS FOR GE


20-GAUGE STEEL OUTER SHEET
STEEL TIE STRAP
20-GAUGE CORRUGATED STEEL STIFFENER
PERMANENTLY BONDED WITH BUNA "N" SYNTHETIC RUBBER COMPOUND
CROSS SECTION—THREE TIMES ACTUAL SIZE

ENERAL MOTORS LOCOMOTIVES

STRONGER, LIGHTWEIGHT PANELS AT FAR LOWER COST—NOW IN PRODUCTION FOR ALL PASSENGER AND FREIGHT LOCOMOTIVES AND AVAILABLE FOR REPLACEMENT SHIPMENT



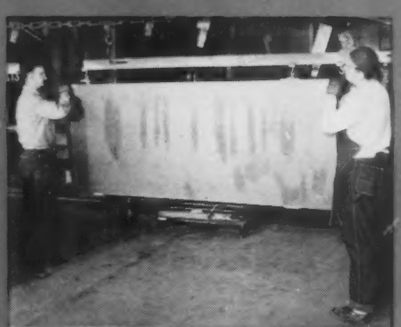
Center swing sash application of new all-metal corrugated panel in F7 locomotive unit.

● **SUPERIOR STRENGTH AND DURABILITY** *at far lower cost per unit* are what you get with the new all-metal side panels now under production at Electro-Motive for all passenger and freight units. Far superior to former metal-bonded-to-wood construction, these new panels have been under actual in-use tests for months. And now they're ready for application to all freight and passenger units, new or old.

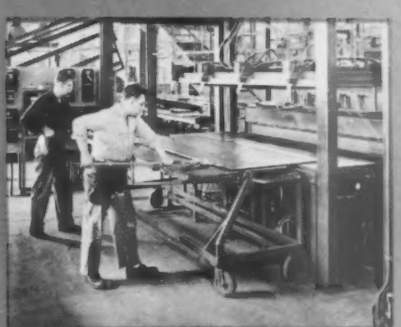
SECRET OF SUCCESS in making these new panels is the use of a special Buna "N" synthetic, rubber-base, heat-setting adhesive that bonds the panels into an integral unit that's strong, light in weight, easily handled. They're capable of resisting temperatures ranging from −60° to 450°. Rust and corrosion cannot attack interior surfaces. There are no soldered seams to fail in these panels—no way for water to penetrate and cause rotting. Laboratory tests indicate a service life of 25 years under normal operations.

LATEST DEVELOPMENT OF GM ENGINEERING, these new panels are turned out at Electro-Motive on a modern conveyorized assembly line—a complete, ready-to-install panel every four minutes.

HERE—and wherever engineered improvements can add to the service and reduce the cost of a General Motors Diesel locomotive—you'll find the combination of the *right* specially designed equipment and skilled workers that mean highest quality. For Electro-Motive combines the world's largest Diesel experience with the industry's most modern and most complete facilities to produce top-quality locomotives and parts at the lowest possible cost.



CONVEYORIZED ASSEMBLY LINE METHOD of manufacture cuts costs. Assembled panel is being loaded on conveyor for bonderizing and prime painting.

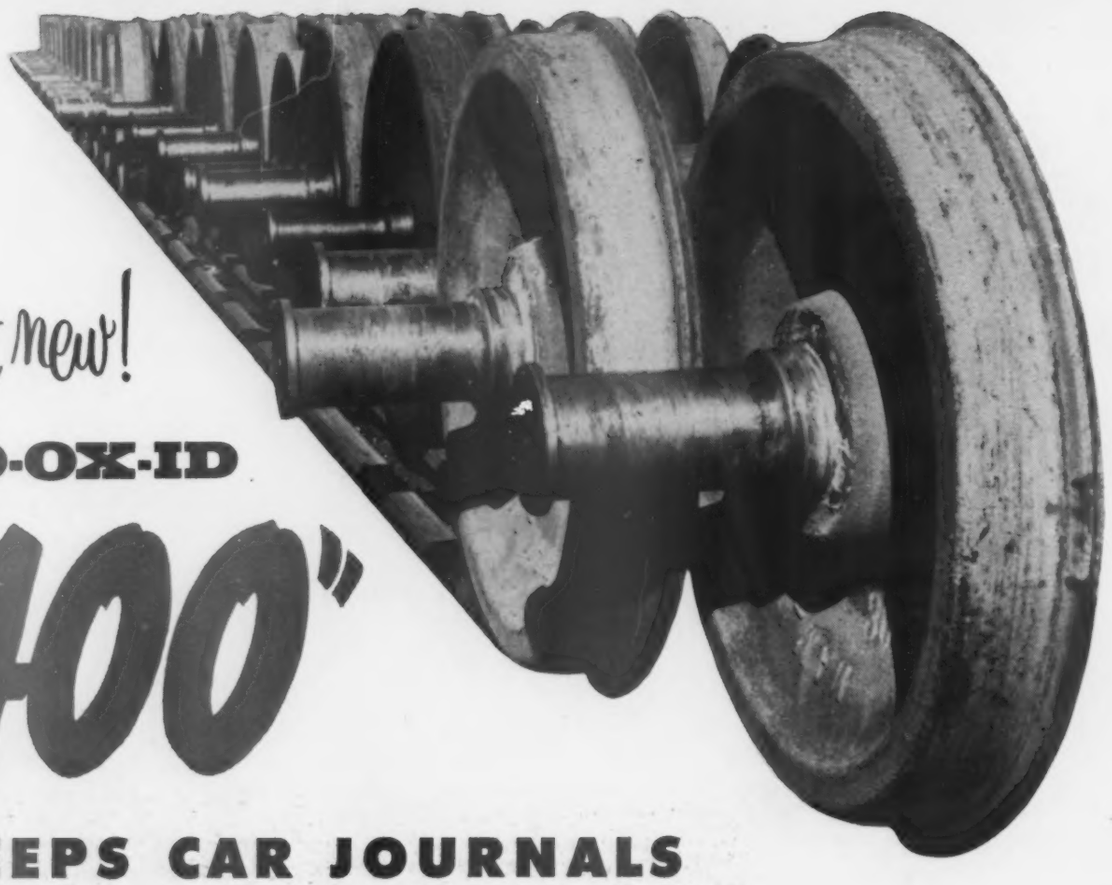


SPECIAL FIXTURES, developed by Electro-Motive engineers, bond the panels into an integral unit under a combination of heat and pressure, with automatic control of time-cycle.

FINISHED PANELS being stacked in special containers for shipment to production lines and to Electro-Motive Parts Warehouses where they will be ready for quick delivery to railroads.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
La Grange, Illinois • Home of the Diesel Locomotive
In Canada: GENERAL MOTORS DIESEL, LTD., London, Ontario

GENERAL MOTORS LOCOMOTIVES



it's new!

NO-OX-ID "400"

KEEPS CAR JOURNALS READY FOR USE WHEN NEEDED

● Here's the protection you've wanted for car journals—Dearborn's new NO-OX-ID "400" developed especially for this use.

NO-OX-ID "400" is an easy-to-apply, self-sealing wax-type film that dries to the touch. NO-OX-ID "400" withstands extreme temperatures . . . *will not run, sag or alligator in hot weather . . . will not crack even at 60° below zero.* Easily removed by solvents or steam.

Write for complete data or see your Dearborn Field Engineer.

Write for Information . . .

A series of bulletins on rust prevention in the railroad industry is available to you. These bulletins will show you how you can reduce maintenance costs by application of the correct NO-OX-IDs and will aid you in their selection.

Dearborn
TRADE MARK

DEARBORN CHEMICAL COMPANY
MERCHANDISE MART PLAZA
CHICAGO 54, ILLINOIS

THE ORIGINAL RUST PREVENTIVE

NO-OX-ID

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

FX-1201

W. P. MARSHALL, PRESIDENT

SYMBOLS
DL = Day Letter
NL = Night Letter
LT = Int'l Letter Telegram
VLT = Int'l Victory Ltr.

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

MR RAILROAD EXECUTIVE

TWENTY TWO CLASS ONE AMERICAN AND CANADIAN RAILROADS EQUIP HOPPER CARS WITH ENTERPRISE UNIT LATCHES THIS RUGGED LOCK ENABLES OPERATION OF SINGLE DOORS IDEAL FOR UNLOADING ON CONVEYORS ELIMINATES USE OF DOOR SPREADERS SAFE AND EASY TO OPERATE LOCKS ACROSS FACE OF DOOR CANNOT DUMP IN TRANSIT OR SWITCHING

ENTERPRISE RAILWAY EQUIPMENT COMPANY

Closeup view of Enterprise Unit Door Latch. Over 100,000 hopper cars are equipped with unit latches.

4457-3

Door Operating Devices Exclusively Since 1903

ENTERPRISE RAILWAY EQUIPMENT COMPANY

59 East Van Buren Street • Chicago 5, Illinois

(*Continued from page 108*)

one direction or the other, thus registering the amount of slack to be compensated for. This causes the regulating nut to move accordingly to establish the proper length of the pull rod or the connecting rod.

While there is normally sufficient clearance in the brake rigging to provide space for renewal of shoes, a hand arrangement is incorporated to release the rigging where clearance is insufficient. Screwing the hand arrangement out retracts the brake shoe head from the wheel to allow replacement of the worn shoe.

Parts in the interior of the casing are packed with grease, oil or rust preventative for long life and trouble-free operation. This lubrication is sufficient to last for at least the three-year interval between major air-brake repairs. The hole in the clevis at the right of the drawing is the principal wearing surface and it is protected by an easily renewable Meehanite bushing.

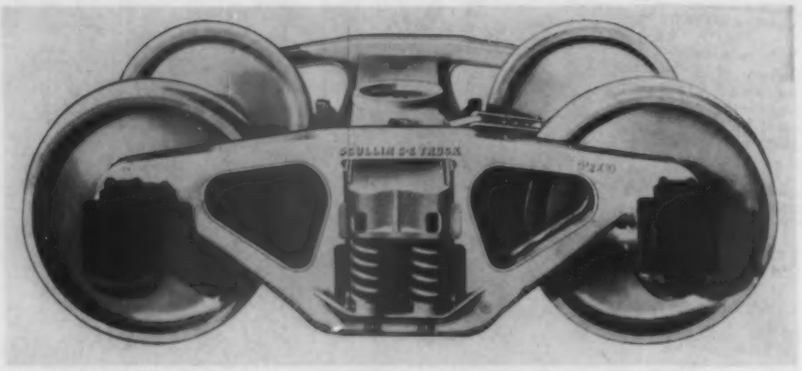
■

Electrical Cleaner

A safety solvent, called Turco-Solv, designed for the cleaning in place of hot main generators and traction motors, has been developed by Turco Products, Inc., Los Angeles, Cal. Developed in conjunction with several Class I railroads, Turco-Solv has been formulated with consideration of health hazards from toxicity as well as safety from flash fires.

The compound can also be used for the cleaning of electrical equipment such as switches, control panels, rheostats, wiring and fuses, panels, resistance boxes, auxiliary motors, etc.

The maker states that Turco-Solv will efficiently replace carbon tetrachloride in all cleaning operations that it quickly and effectively removes deposits of grease, oil, metallic particles, carbon dust and other causes of dangerous and costly flashovers, that it leaves no oily residues and is safe for use on all metal and wood surfaces, as well as well-bonded paint. It has a Tag closed-cup flash point of over 200 deg. F., and will not separate or boil off during evaporation, leaving highly flammable vapors or residues. Since it is non-conductive, it can be used to clean motors while they are hot. It is applied by non-atomizing low pressure spray or brush.



Scullin Type CC freight-car truck especially designed for both general and high-speed freight service.

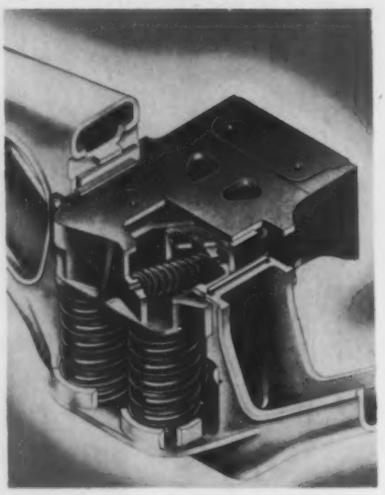
New Scullin Type-CC Freight Car Truck

The Scullin Steel Company, St. Louis, Mo., has developed a new Type-CC (Constant-Control) truck which is designed to improve both general and high-speed freight service and has already demonstrated a notably low lading-damage index (vertical, .44; lateral, .43) in rigidly supervised A.A.R. accelerometer tests. The substantial reduction in vertical oscillation and build-up of service shocks is also expected to effect appreciable savings in maintenance of car equipment and roadway.

As shown in the phantom view, constant control of vertical and lateral bolster movement is secured by the snubbing action of two wedge-shape friction castings. These exert a restraining action on vertical hardened steel wear plates in the side frame columns. Integrally-cast pockets in the truck bolster ends hold the friction castings, with their component springs, in a horizontal position as indicated.

The Type-CC truck is said to be simple to assemble or dismantle. After inserting the friction castings and lateral coil springs in the bolster pockets, a standard bolt is applied laterally through the castings to compress the springs enough so the bolster can enter the side frame. The bolster is raised to a position which permits removal of the assembly bolts and the truck is then put together in the usual manner. In dismantling the reverse procedure is followed.

The number of parts in the new Scullin Type-CC trucks has been minimized in the interest of having few parts to wear out and carry in stock which means proportionate savings in operating expense. The trucks are available either with conventional journal boxes or in pedestal design for the application of roller bearings. Any desired A.A.R. standard long-travel springs may be used. Castings are made either of Grade B or high-tensile steel, as desired. No spring planks or spring plates are required. Both side frames and bolsters meet fully A.A.R. tests and specifications.



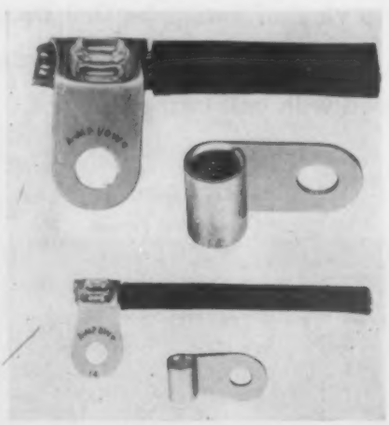
The working parts of the Type CC side frame and bolster are easily inspected, yet protected from dirt and water.

■ ■ ■

Solderless Terminals

The addition of flag-type solderless terminals to its line of heavy duty power terminals has been announced by Aircraft-Marine Products, Inc., Harrisburg, Pa. These terminals are available for eight wire sizes from No. 8 to No. 4/0. Tongues are designed for a wide range of stud sizes. Made of pure copper, they are electro-tinned for good conductivity and surface protection. Because of the characteristics of the crimp, the terminals can be used with solid, stranded, or irregularly shaped wires or combinations of these types.

Precision crimping of the terminals may be done with the AMP hand hydraulic tool. The pneumatic hand tool can be used to crimp sizes No. 8 through No. 1/0.



NATIONAL

RUBBER-CUSHIONED DRAFT GEARS

for Diesel Locomotives

. . . COMPLETE THE DRAW-GEAR ASSEMBLIES

along with

NATIONAL COUPLERS of AAR H Tightlock or AAR E Design and rugged, quality-controlled Cast Steel YOKES

RUBBER IS THE THING!

Its use as the cushioning medium in NATIONAL gears for this exacting service has been proved by every means available to roads and diesel builders.

for

PERFORMANCE and ECONOMY

NATIONAL'S ENGINEERING, in conjunction with the rubber manufacturer, solved the diesel draft gear requirement with designs adapted to short sill pockets. Builders' objective called for the maximum reduction in chassis overhang. This was accomplished by the short gear pockets and special yoke designs made possible by the use of National Rubber-Cushioned Draft Gears.

Our practical designs vary chiefly from standpoint of amount of rubber needed to meet different ratings of diesel units based upon continuous tractive effort. The renewable gear pads used, comprise rubber of engineered contour and tested compound vulcanized to surfaces of steel plates. There is no metallic abrasion against rubber surfaces.

The strong steel gear castings are held to close tolerances for tight fit in National yokes and positive bearing of broad surfaces to sill pocket stops. A-7273

APPRAISAL OF MERIT IS BASED UPON

HIGH CAPACITY	This increases with severity of the shock.
MORE PROTECTION	A greater proportion of the impact is cushioned over the entire range of capacity.
LOWER SILL PRESSURES	The primary function of National rubber gears is to protect car and locomotive structure. Effectiveness of rubber for cushioning is outstanding at the higher levels of shock intensity.
NO CREEPING	Rubber eliminates the creep or slip which readily occurs in friction gears under fluctuating load.
RESPONSE TO DRAWBAR FORCE	Action of National rubber gears is smooth, instantaneous and effective.

NATIONAL
TECHNICAL CENTER
Cleveland
Of marked interest to the Railroads and Related Industry!

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY
Cleveland 6, Ohio
COUPLERS • FREIGHT TRUCKS • YOKES • FRICTION AND RUBBER DRAFT GEARS • JOURNAL BOXES AND LIDS

NATIONAL EST. 1868 PRODUCTS and TECHNICAL SERVICES

IT'S JUST THAT SIMPLE. There's only one reason in the world why 2 out of 3 materials handling men prefer Roebling wire rope and slings... *they cost a lot less on the job than any others.*

For top efficiency and economy, call your nearest Roebling office for a Field Man. He'll suggest the best ropes and Flatweave and All-Purpose Slings for your work.

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

Spokane, Portland and Seattle Railway
Smart New Streamliners

Spicer Generator-Drive Equipped

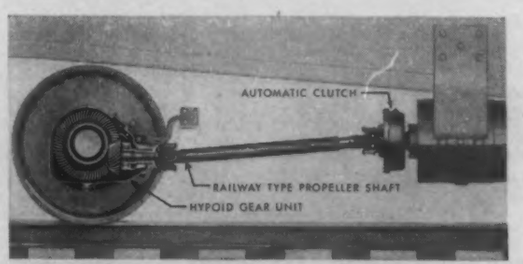
Nature has lavished many endowments of scenic beauty and grandeur upon the wonderful Pacific Northwest Country.

They are spread with a generous hand among the mountains, along the rivers and at the seashore, and can be seen to splendid advantage from the modern trains of the *Spokane, Portland and Seattle Railway.*

Every up-to-date convenience is offered the traveler on the *S P & S* streamliners, with electrical services at hand everywhere to provide restful comfort throughout the trip. Energy for all electrical equipment is supplied through Spicer Generator Drives.

The Spicer Drive consists of a very simple application of long-lived hypoid gears and pinion mounted on the standard railway car axle. Features include high efficiency and economy, safety, quietness and smoothness.

An imposing list of America's crack trains and streamliners rely upon Spicer equipment for electrical service of the highest efficiency. Write for literature giving complete details of the Spicer Railway Generator Drive.



The Spicer Railway Generator Drive is easily adaptable to old and new equipment.

49 YEARS OF
Spicer
SERVICE

The Spicer Railway Generator Drive is manufactured, sold and serviced by

SPICER MANUFACTURING
Division of Dana Corporation
TOLEDO 1, OHIO

NEWS

Diesels Big Fuel Savers in '52

THE fuel cost per 1,000 gross ton-miles of road freight service performed in 1952 by diesel-electric locomotives averaged 16.1 cents. This was a little more than half the fuel cost—31.1 cents—of a like amount of freight service performed by coal-burning steam locomotives.

The comparison was made by the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission in a recent issue of "Monthly Comment." The figures covered Class I roads, including switching and terminal companies.

They also showed, as to road freight service, that fuel costs per 1,000 gross ton-miles performed by oil-burning steam locomotives and electric locomotives were 37.1 cents and 28.8 cents, respectively. As to yard service, fuel costs per switching locomotive hour were: Diesel-electrics, 69.8 cents; coal burners, $2.40; oil burners, $2.79; electrics, $1.19.

As to passenger service, fuel costs per passenger-train car-mile were: Diesel-electrics, 3 cents; coal burners, 5.5 cents; oil burners, 4.3 cents; electrics, 3.9 cents.

The "Comment" article also had figures showing that diesel-electrics last year performed 64.95 per cent of road freight service, but accounted for only 48.01 per cent of that service's fuel costs. Likewise, they performed 71.5 per cent of the passenger service and 76.64 per cent of yard service; but their proportions of those services' fuel costs were only 61.39 per cent and 48.9 per cent, respectively.

Hot Boxes—100 Times Too High

PLYPAKS have accounted for only 0.77 per cent of the hot boxes on 70-ton hopper cars, not 77 per cent as erroneously mentioned in next to the last paragraph of the first column on page 57 of the May issue. This is in the article by M. A. Pinney describing the results of hot-box investigations conducted in the test department of the Pennsylvania.

Miscellaneous Publications

FLEXIBLE METAL HOSE. Universal Metal Hose Company, 2133 South Kedzie avenue, Chicago 23. Technical Data Book U-111 includes information on application, temperature ranges of various types of metal and wire braided hose, dimensions, couplings, assemblies, etc.

■

VALVES.—Lunkenheimer Company, Box 360-U, Cincinnati 14. *Circular No. 558* describes dimensions and functions of nonmetallic disc valves for handling saturated steam; for cold water, air and gas, and for gasoline, oil, butane and propane. *Circular No. 577* describes graphically di-

(*Continued on page 123*)

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	total	
July, 1950	2,745,932,894	....	....	23,957	114,619
August, 1950	2,937,455,020	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952	2,869,928,617	1,742	3,632	5,374	534,040
January, 1953	2,828,906,262	2,219	4,123	6,342	446,059
February, 1953	2,625,563,462	2,111	4,059	6,170	425,537

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MAY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	*No. of Units*	*Horse-Power*	*Service*	*Builder*
Detroit, Toledo & Ironton	2[1]	1,500	General purpose	Electro-Motive
New York Central	80[2]	1,500	Road switching	Electro-Motive
	34[3]	2,250	Passenger	Electro-Motive
	10[3]	1,600	Road switching	Alco-G. E.
Pittsburgh & Lake Erie	35	1,000	Switching	Alco-G. E.
	15	1,600	Road switching	Alco-G. E.

FREIGHT-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Chicago & Eastern Illinois	200[3]	55-ton gondola	Company shops
Chicago, Indianapolis & Louisville	30[4]	70-ton hopper	Pullman-Standard
Gulf, Mobile & Ohio	300	95-ton ore	Pullman-Standard
Illinois Terminal	10[5]	Cabooses	St. Louis Car
Louisville & Nashville	250[6]	95-ton ore	Pullman-Standard
St. Louis-San Francisco	200[7]	Ore	Pullman-Standard
	300[7]	70-ton gondola	Pullman-Standard
	300[7]	55-ton hopper	Pullman-Standard
	100[7]	Flat	American Car & Fdry.
Southern	250[8]	95-ton ore	Pullman-Standard
Texas & Pacific	250[9]	50-ton box	Company shops
Wabash	200[10]	50-ton box	American Car & Fdry.
	100[10]	50-ton gondola	Company shops

PASSENGER-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Northern Pacific	2[11]	Parlor-lounge	Pullman-Standard
	2[11]	Coaches	Pullman-Standard
	4[11]	Sleeping	Pullman-Standard

[1] Estimated cost, $300,200. Delivered in April.

[2] Deliveries expected to be completed by fall, when all Central service east of Cleveland, as well as all passenger service east of Detroit, will be fully dieselized. The Central then will own 2,113 diesel units, with total horsepower of 2,758,900 or about 60 per cent of the horsepower necessary for complete dieselization of the system.

[3] One hundred to be built in 1953; 100, in 1954.

[4] Estimated cost, $266,910. Delivery scheduled for late third, or early fourth quarter of this year.

[5] Estimated cost, $150,000. Delivery scheduled for late third, or early fourth quarter of 1953.

[6] Estimated cost, $2,500,000. Delivery expected during first quarter of 1954.

[7] Ore cars, gondolas and flat cars scheduled for fourth quarter delivery; hopper cars, for delivery during first quarter of 1954.

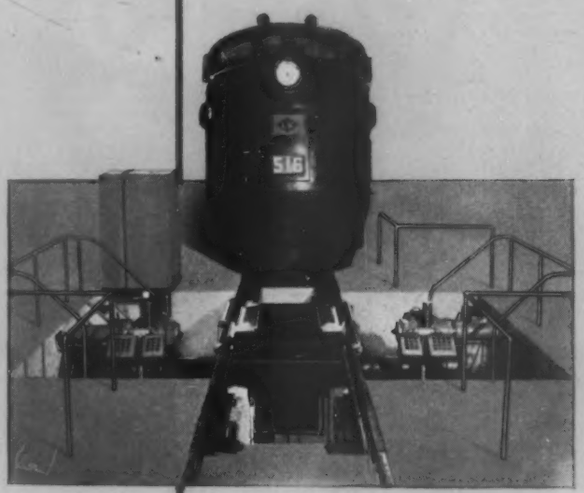
[8] Approximate cost, $3,000,000. Delivery expected late this year.

[9] Scheduled for construction in 1954.

[10] Estimated cost of box cars, $1,694,192; gondola cars, $1,300,200. Delivery of box cars scheduled for third quarter of 1953. Gondolas to be delivered during second half of the year.

[11] Delivery expected to begin during third quarter of 1954.

Notes: *Atchison, Topeka & Santa Fe.*—The Santa Fe is rebuilding 800 refrigerator cars in company shops. The cars are being stripped and provided with entirely new steel bodies. About 15 cars will be completed each day.

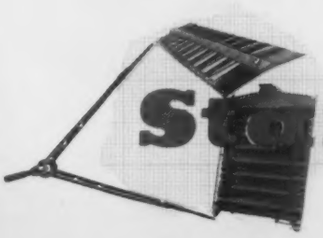


an "extra dividend" from **Standard's** railroad laboratory...

THE WHEEL TRUING MACHINE!

Railroad men have looked to STANDARD for years for the latest design and fabrication techniques in roofs, ends and other car components—but STANDARD does not confine itself where the good of the railroads is concerned.

The development of the STANDARD Wheel Truing Machine is a good example of the "laboratory thinking" which has produced many money-saving, income-producing devices for the railroads. This machine—a masterpiece in precision design—puts rolling stock back into productive use in *hours* instead of the *days* it used to take. Thanks to Standard's Railroad Laboratory *it is no longer necessary to remove wheels for truing*—which means more net-ton miles, and another STANDARD investment in the future of railroading!



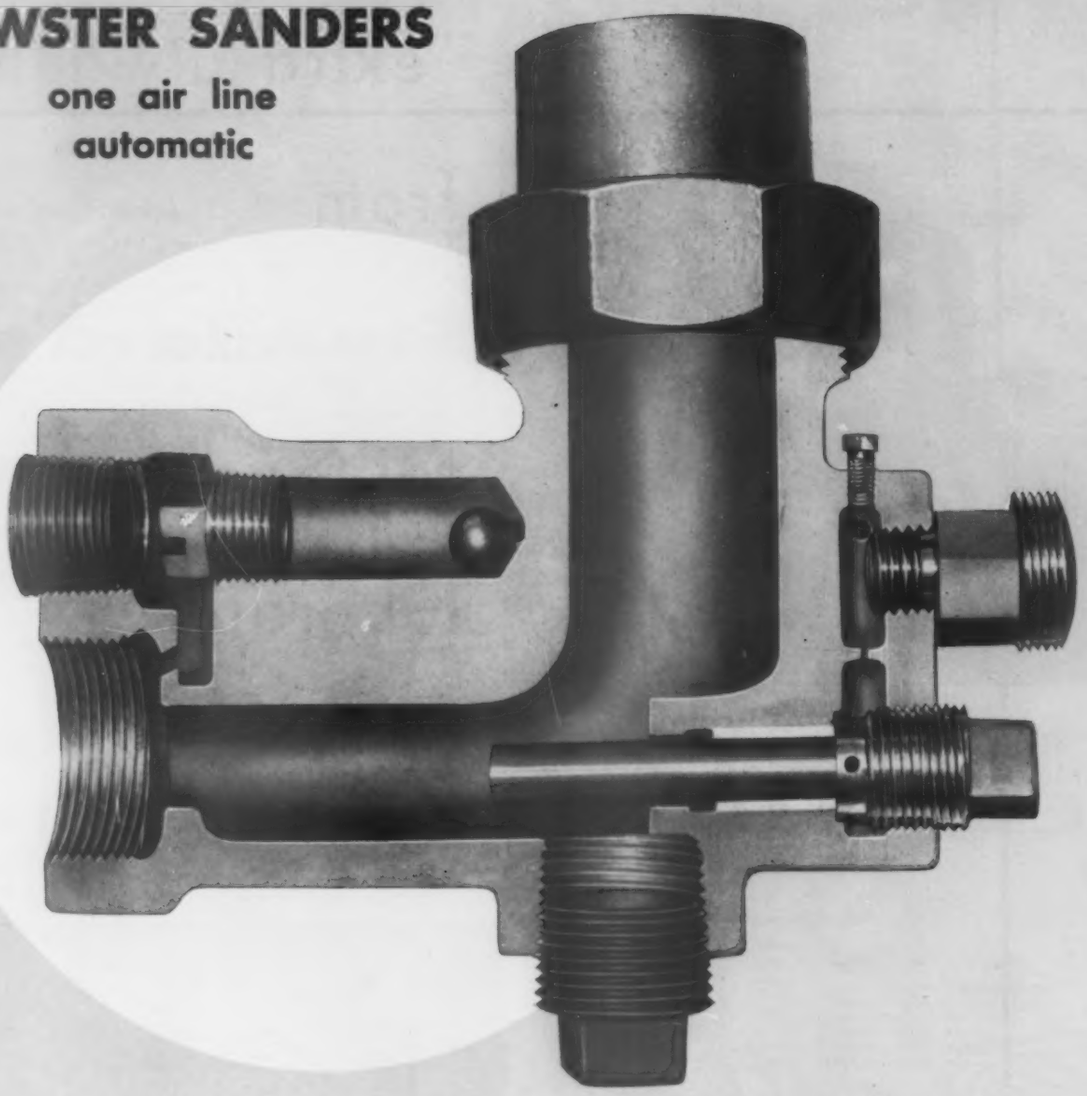
Standard

RAILWAY EQUIPMENT MANUFACTURING COMPANY

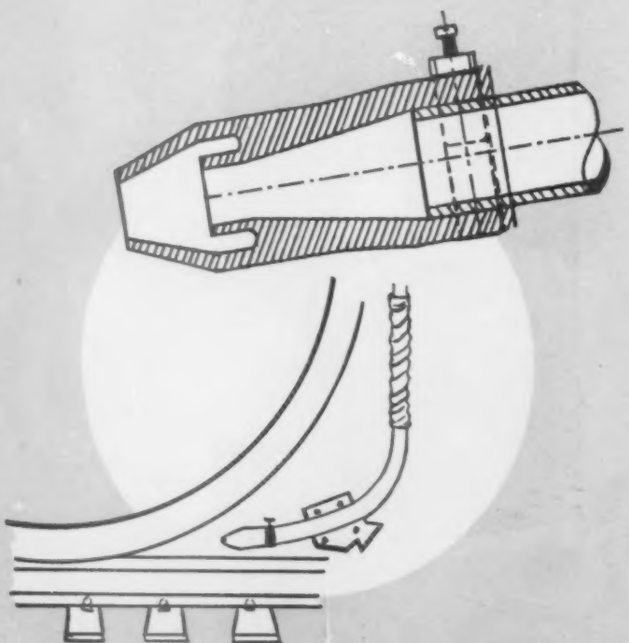
310 S. MICHIGAN AVE. • CHICAGO • 347 PARK AVENUE • NEW YORK

BREWSTER SANDERS

one air line
automatic



Brewster Sanding Equipment applicable to all Builders' standard piping at no extra cost.



BREWSTER SAND PIPE NOZZLE

1 — DIRECTS SAND to point of contact

2 — MINIMUM sand flow

3 — FEWER sand box refills

4 — BETTER adhesion between wheel and rail

5 — NO WATER can enter pipe by capillary attraction

6 — SIZES TO FIT both 1" or 1¼" pipe

MORRIS B. BREWSTER CO., INC.

G. S. TURNER, PRESIDENT

8 South Michigan Avenue Chicago 3, Illinois

Designed for Passenger Comfort!

Built by Pullman-Standard

New Sleepers for the L & N with Latest Type COMMONWEALTH Outside Swing Hanger Trucks

Commonwealth Truck with Outside Hanger Spring Suspension

These new cars for the Louisville & Nashville Railroad embody many improvements designed for the utmost in sleeping car passenger comfort. Contributing much to a smooth, comfortable ride are COMMONWEALTH Trucks of latest design with outside hanger spring suspension, all-coil springs, bolster anchors and large central bearings.

Outside swing hanger suspension reduces car body roll, provides easier riding at all speeds and greatly simplifies inspection and maintenance. Large central bearings eliminate truck shimmy and side bearing problems, greatly increase wheel mileage between turnings and require no lubrication.

The underframes of these new cars have COMMONWEALTH one-piece Platform Center Sill Castings incorporated at both ends. Their great inherent strength assures greater passenger safety and minimizes damage in collision.

One-Piece Platform Center Sill Castings

GENERAL STEEL CASTINGS
GRANITE CITY, ILL. EDDYSTONE, PA.

Minimize uneven wear with

Speer MULTIFLEX Brushes

There's a Speer Application-Tested Brush for every railroad use:

Traction Motors • Main Generators • Auxiliary Generators • Motor Generators and Dynamotors • Traction Motor Blowers • Exciters • Fuel Pump Motors

Speer MULTIFLEX* Brushes operate in single holders—yet they give all the advantages of double brushes.

Besides minimizing uneven wear, they . . .

IMPROVE COMMUTATION • REDUCE VIBRATION • HAVE LONGER LIFE

Reason: their patented two-section construction.

And like *all* Speer Brushes, MULTIFLEX Brushes are 2-way application-tested. First, by hours and hours of laboratory test-runs and, second, by thousands of miles of carefully observed, on-the-job operation.

Next time, get application-tested, double-brush advantages—in a single brush. Specify Speer MULTIFLEX.

*Patent No. 2,181,076

SPEER *Carbon Co.*

St. Marys, Pa.

Divisions: Speer Resistor
Jeffers Electronics
International Graphite & Electrode

(*Continued from page 118*)

mensions and features of Renewo valves, with sectional views of iron-bodied Ferrenewo and bronze Renewo valves in globe and angle fullway and throttling types and in lift checks.

■

PRESS BRAKES. Cincinnati Shaper Company, Hopple, Garrard, and Elam streets, Cincinnati 25. Catalog B-4 describes and illustrates Cincinnati line of all-steel press brakes and their application.

■

STAINLESS WIRE. Allegheny Ludlum Steel Corporation, Advertising Department, 2020 Oliver building, Pittsburgh 22, Pa. 20-page booklet contains tables of physical properties, corrosion resistance and analysis, with a discussion of the principal uses of stainless-steel wire (cold heading, rope, welding and winding, etc.).

■

"NEW DEVELOPMENTS IN OIL DIESEL, DUAL FUEL DIESEL AND HIGH COMPRESSION SPARK IGNITION ENGINES." Engine Division, Worthington Corporation, Buffalo 5. Bulletin S-500-B55 describes and illustrates heavy-duty internal combustion engines. Includes heat balance chart illustrating waste heat recoverable from exhaust gases and jacket cooling water, and fuel cost charts for determining most economical type of engine selection.

■

POWER AND IDLER TURNING ROLLS. Worthington Corporation, Welding and Assembly Positioning Equipment Division, Plainfield, N. J. Bulletin R-228A on turning rolls, used as welding positioners for all types of cylindrical forms. Covers Models A, B, C and 75, for capacities to 5, 20, 45 and 75 tons, respectively.

■

PRECISION BORING MACHINES. Ex-Cell-O Corporation, 1200 Oakman Boulevard, Detroit 32. Bulletin 31205; 16 pages. Illustrates and describes Ex-Cell-O line of boring machines for straight and taper boring and turning; contour boring and turning; grooving and recessing; facing, counterboring, chamfering, and combinations of these operations.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of January 1953	1952
3	Road locomotive miles (000) (M-211):		
3-05	Total, steam	13,488	20,691
3-06	Total, Diesel-electric	30,205	25,685
3-07	Total, electric	711	802
3-04	Total, locomotive-miles	44,466	47,179
4	Car-miles (000 000) (M-211):		
4-03	Loaded, total	1,628	1,648
4-06	Empty, total	907	898
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):		
6-01	Total in coal-burning steam locomotive trains	23,761	37,288
6-02	Total in oil-burning steam locomotive trains	5,725	8,460
6-03	Total in Diesel-electric locomotive trains	82,988	69,419
6-04	Total in electric locomotive trains	1,932	2,135
6-06	Total in all trains	114,610	117,311
10	Averages per train-mile (excluding light trains) (M-211):		
10-01	Locomotive-miles (principal and helper)	1.03	1.04
10-02	Loaded freight car-miles	39.70	38.60
10-03	Empty freight car-miles	22.10	21.00
10-04	Total freight car-miles (excluding caboose)	61.80	59.60
10-05	Gross ton-miles (excluding locomotive and tender)	2,796	2,745
10-06	Net ton-miles	1,263	1,281
12	Net ton-miles per loaded car-mile (M-211)	31.80	33.20
13	Car-mile ratios (M-211):		
13-03	Per cent loaded of total freight car-miles	64.20	64.70
14	Averages per train hour (M-211):		
14-01	Train miles	18.30	17.10
14-02	Gross ton-miles (excluding locomotive and tender)	50,519	46,283
14	Car-miles per freight car day (M-240):		
14-01	Serviceable	43.80	44.20
14-02	All	41.80	42.20
15	Average net ton-miles per freight car-day (000) (M-240)	853	907
17	Per cent of home cars of total freight cars on the line (M-240)	47.40	40.40

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):		
3-05	Steam	5,365	8,753
3-06	Diesel-electric	20,288	18,164
3-07	Electric	1,658	1,720
3-04	Total	27,310	28,637
4	Passenger-train car-miles (000):		
4-08	Total in all locomotive-propelled trains	275,989	282,463
4-09	Total in coal-burning steam locomotive trains	29,459	46,736
4-10	Total in oil-burning steam locomotive trains	18,134	27,428
4-11	Total in Diesel-electric locomotive trains	209,831	189,415
12	Total car-miles per train-miles	9.84	9.73

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):		
1-01	Steam, coal-burning	641	1,020
1-02	Steam, oil-burning	118	174
1-03	Diesel-electric[1]	3,426	3,225
1-06	Total	4,208	4,444
2	Passenger yard switching hours (000):		
2-01	Steam, coal-burning	25	38
2-02	Steam, oil-burning	6	13
2-03	Diesel-electric[1]	270	265
2-06	Total	334	350
3	Hours per yard locomotive-day:		
3-01	Steam	6.30	7.30
3-02	Diesel-electric	16.20	17.10
3-05	Serviceable	14.50	14.60
3-06	All locomotives (serviceable, unserviceable and stored)	12.70	12.60
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.78	1.86
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.75	0.77

[1]Excludes B and trailing A units.

SUPPLY TRADE NOTES

WESTINGHOUSE ELECTRIC CORPORATION. —The Westinghouse Electric Corporation, in cooperation with diesel locomotive manufacturers using Westinghouse electrical equipment, has initiated a new plan for handling electrical renewal parts and "unit exchange" equipment, it has been announced by S. C. Palmer, transportation department manager.

Under the plan, Westinghouse is responsible for handling directly with railroads all inquiries, negotiations and orders involving main propulsion and auxiliary electrical-energy generating equipment; electrical control apparatus; traction motors, pinions, gears and gear cases; all renewal parts for this apparatus; and V-belts for main generators. All other locomotive equipment remains the responsibility of the locomotive builder.

"Westinghouse maintains stocks of electrical renewal parts in warehouses strategically located throughout the country," Mr. Palmer said. "Under the unit exchange arrangement, fully guaranteed electrical rotating units are stocked at 16 locations in the U. S. When a customer needs a replacement unit it is shipped to him from Westinghouse stock. The replaced unit is returned to Westinghouse for reconditioning and is placed in the unit exchange pool."

David C. Fulton, formerly district machinery electrification manager of Westinghouse, has been appointed manager of marine, aviation and transportation sales, to succeed *Harold G. Rethmeyer*, who has been appointed manager of the company's newly established San Francisco branch office. *M. Wayne Scolari, George Skipton, G. Burnett Mason* and *David F. Roach* have been appointed sales supervisors at San Francisco.

■

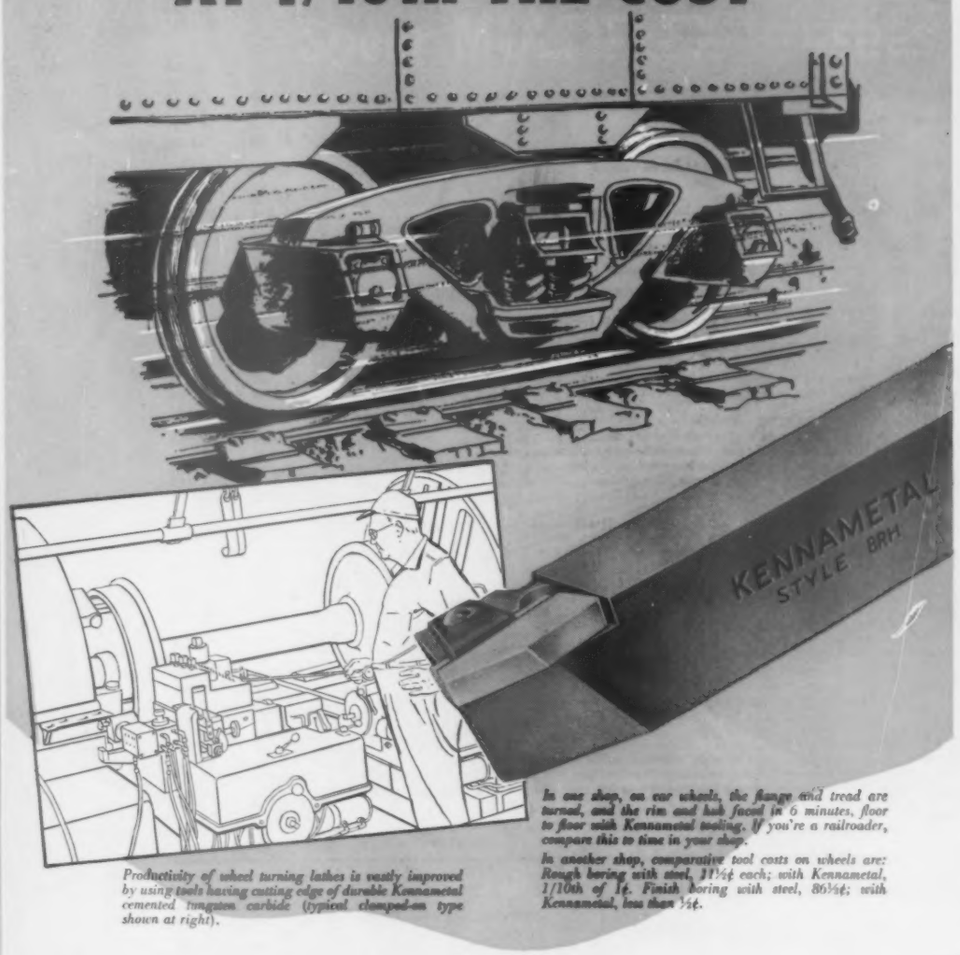
BURGESS BATTERY COMPANY. *Charles E. Balz* has been appointed sales manager of the Burgess Battery Company, United States Battery division. Mr. Balz was assistant sales manager for the past two years.

■

TEXAS COMPANY.—*J. C. Droke*, who has been appointed assistant to manager, railway sales department, with headquarters at New York, as announced in the May issue, joined Texaco in 1940 as a lubrication engineer at Kansas City. He was for several years with the foreign operations depart-

HOW KENNAMETAL PROMOTES INDUSTRIAL PRODUCTIVITY

Wheeling THE RAILS AT 1/10th THE COST



Productivity of wheel turning lathes is vastly improved by using tools having cutting edge of durable Kennametal cemented tungsten carbide (typical clamped-on type shown at right).

In one shop, on car wheels, the flange and tread are turned, and the rim and hub faced in 6 minutes, floor to floor with Kennametal tooling. If you're a railroader, compare this to time in your shop.

In another shop, comparative tool costs on wheels are: Rough boring with steel, 11½¢ each; with Kennametal, 1/10th of 1¢. Finish boring with steel, 86½¢; with Kennametal, less than ½¢.

It's not the "heavy hauling" that flattens car wheels—it's the "hammer-hammer-hammer" on the hard rail way. That's why railroad car wheels have to be reconditioned frequently—and with eight wheels per car, machining is a major time and cost operation.

Railroad shops, looking for means to save time and to reduce operating expense, are now using Kennametal as a tool material to machine wheels, as well as other parts . . . with these results:

Where Kennametal has replaced steel tools—machining is done in one-third the time, with savings in tool costs up to 90% (see typical reports above).

Your product or production process, when wear is a critical factor, may be vastly improved by using Kennametal cemented tungsten carbide. It is a unique material—tough, strong, almost as hard as the diamond, up to 50 times as durable as steel.

Tell us your problem. Our metallurgists and engineers will help you solve it with Kennametal.

KENNAMETAL Inc.
Latrobe, Pa.

WORLD'S LARGEST Independent Manufacturer Whose Facilities are Devoted Exclusively to Processing and Application of CEMENTED CARBIDES

ment in South America and was in charge of the St. Louis division office before his transfer to New York.

W. S. Custis, who has been appointed manager, St. Louis division, railway sales department, became associated with the Texas Company at Springfield, Mo., in 1943 as lubrication engineer. He was assistant division manager at Chicago prior to his transfer to St. Louis.

■

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY.—*C. P. McDonald* has been appointed sales engineer for the transportation division of Minneapolis-Honeywell, with headquarters in Washington. Mr. McDonald will cover the southeastern part of the United States, handling sales and servicing of controls for railways, buses,

C. P. McDonald

streetcars and other transportation vehicles. The area formerly was covered out of the company's Philadelphia office.

Mr. McDonald is a graduate of Kansas State College. Before joining Honeywell in 1949 he was sales manager and chief engineer for Chrysler Airtemp Distributors, Baltimore.

■

SAFETY SEAL PISTON RING COMPANY.—*Weldon Baker* has been elected president of Safety Seal Piston Ring Co., Fort Worth, Tex. Safety Seal, established in April, 1951 by the late William S. Baker as a

Weldon Baker

partnership with his sons, Weldon and Don Baker, was incorporated in January of 1953. New plant facilities are located at 1111 Foch Street, Fort Worth.

BALDWIN LIMA-HAMILTON CORPORATION.—*Ralph P. Johnson*, general manager of field service, retired on June 1.

Mr. Johnson became an apprentice in the employ of the Baldwin Locomotive Works upon receiving the degree of M.E.

R. P. Johnson

at Cornell University in 1912. From 1915 until 1917 he was metallurgical engineer for the Remington Arms Company of Delaware. During World War I he served with the A.E.F. as a major in the Ordnance Department, U.S. Army. He returned to Baldwin in 1919 as chief service engineer. He was appointed assistant to general sales manager in 1938; chief engineer in 1939, and general manager, service, in 1948. Mr. Johnson is a Fellow of the American Society of Mechanical Engineers and author of "The Steam Locomotive" published in 1943.

■

A. M. BYERS COMPANY.—*Buckley M. Byers*, who has been appointed general manager of wrought-iron sales as announced in the May issue, is a grandson of the firm's founder. Upon graduation from Yale University in 1940 he joined the Byers Company and was assistant manager of the Washington office until 1942 when

Buckley M. Byers

he entered the United States Navy as an ensign. Upon his discharge as a lieutenant in 1945, he returned to Byers as assistant manager of the New York office. In April 1947 he was appointed manager of the export department and, on February 1, 1951, became assistant manager of steel sales.

CHASE BRASS & COPPER CO.—*Payne C. Barzler, Jr.*, who has been southern Texas sales representative of Chase Brass & Copper Co., subsidiary of Kennecott Copper Corporation, has been named district manager of this newly-created Chase sales district in Houston, Tex. where a sales office and branch warehouse has been opened at 16 Drennan Street.

■

C & D BATTERIES, INC.—*F. H. Pelletier*, 1729 Santee street, Los Angeles, will service C & D customers in Southern California. *McCormick-Morgan Company*, 725 Second street, San Francisco, will handle sales and service activities in Northern California. *N. J. McCormick* will cover the general Portland, Ore., area, with offices at 427 North Cook street, Portland. *C. M. Rogers* of the Industrial Products Company, will cover Washington, northern Idaho, and eastern Montana. He will be located at 2911 First Avenue, South, Seattle.

■

CHARLES R. ELLICOTT, manufacturers' associate, has opened an office at 50 Church street, New York 7. Mr. Ellicott had been resident vice-president of the Westinghouse Air Brake Company until his retirement on January 1, 1950. Since then he had been located at 30 Broad street.

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CLEANING FOR RAILROAD FACILITIES

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For a host of railway applications, the fast, economical Hypressure JENNY does a thorough cleaning job in one-tenth the time that hand methods require. It is particularly useful for cleaning locomotive and car running gear parts and sub-assemblies before machining, thus saving 25 to 60% in shop production time.

JENNY, the original and only fully patented steam cleaner, is manufactured by Homestead Valve Mfg. Co. More than 40,000 units are in daily use throughout industry. Portable, self-contained, it rolls to the job; and from a cold start, is ready for use in less than 90 seconds. Models and capacities for every railroad need. *Write for complete information.*

Exclusive Distributors to the Railroads

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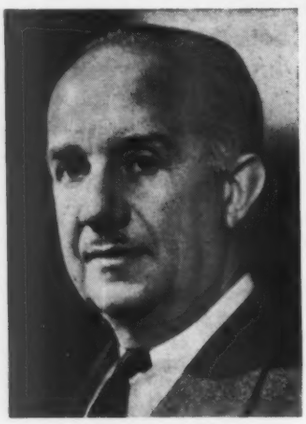
Phone Scranton 7-7391

COMBUSTION ENGINEERING, INC., SUPERHEATER COMPANY, INC.—Combustion Engineering—Superheater, Inc. has changed its name to Combustion Engineering, Inc. Business in connection with products for steam and diesel locomotives will continue to be handled by the Superheater Co., Inc.,

Joseph V. Santry

as a division of Combustion Engineering. Concurrently with the change in name, the following executive changes have been made: *Joseph V. Santry*, president, has been elected chairman of the board and will continue as chief executive officer; *Samuel G. Allen*, formerly chairman of the board, has retired, but will continue as



Martens H. Isenberg

chairman of the executive committee; *Martens H. Isenberg*, formerly executive vice-president, has been elected president to succeed Mr. Santry, and *George D. Ellis*, vice-president and controller, has been appointed vice-president in charge of finance to succeed *Harold H. Berry*, who has reached retirement age. Mr. Berry will continue as a director.

■

AMERICAN CAR & FOUNDRY CO.—*Gilbert L. Holt* has been appointed works manager of the Berwick, Pa., plant.

Mr. Holt attended the University of Wisconsin, and in 1936 became associated with the Fruit Growers Express Company as mechanical superintendent. He was appointed production control manager of the Indiana Steel Products Company in 1943, and plant manager of the International Railway Car Company in 1944. He has been with American Car & Foundry since 1948, serving successively on the New York staff; as assistant district manager at Madison, Ill., and as chief industrial engineer, superintendent of the war materials department, and as production manager at Berwick.

■

DEARBORN CHEMICAL COMPANY.—*J. F. Wilkes* has been appointed director of research and product development. Mr. Wilkes, who has been technical director of the railroad department, will be responsible for operation and administration of the company's laboratory.

E. R. Glover has been appointed technical director of the railroad department.

Mr. Glover became associated with Dearborn in 1939 as a railroad department service engineer on the Louisville & Nashville. He was assigned to field technical service in November 1952.

■

P. A. MCGEE, consulting engineer, transportation, has opened an office at 50 Church street, New York 7. Mr. McGee, until 1951, had been assistant manager, Eastern Region, of the Electro-Motive Division, General Motors Corporation. Since then he had been located at 30 Broad street.

Three C-D-F TAPES to meet your heat and electrical insulating needs

C-D-F Silicone Tapes for A.I.E.E. Class H Electrical Insulation. Available in Varnished Fiberglas cloth and Silicone Rubber-coated Fiberglas cloth. Resistant to high temperatures; high dielectric strength, low dielectric losses, excellent moisture resistance and high tensile strength. They resist mild alkalis, non-oxidizing acids, mineral oils, oxygenated solvents. Available in a range of sizes on continuous rolls. Write for Technical Bulletin #47.

C-D-F Tapes of Teflon* have the desired mechanical and electrical properties for heavy duty motor, generator, and conductor insulation. Unaffected by temperature fluctuations, exposure to oils and greases, or weather conditions. Fiberglas supported and unsupported Teflon tapes are available in a range of sizes.

C-D-F Micabond Tapes have an inherently high and permanent resistance to heat with good dielectric properties. Micabond Tapes are used for insulating motor and generator armature and field coils, turbogenerator coils, and many similar applications where flexible high quality insulation of A.I.E.E. Classes B and H insulators are required. Available in a wide range of sizes with many different backings including: fiberglas, silk, Cellophane*, cotton, paper, and Mylar*.

If you have an insulating problem, probably a C-D-F product is the answer. C-D-F manufactures and fabricates electrical insulation, laminated and molded plastics. Sales offices are located in principal cities. Call your C-D-F sales engineer—he's a good man to know!

*du Pont trademarks.

THE NAME TO REMEMBER .. C-D-F SILICONE, TEFLON, MICABOND TAPES

Continental-Diamond Fibre Company

NEWARK 104, DELAWARE

Here's the latest available information about Simplex Diesel Electric Locomotive Cable. It's just off the press and contains up-to-date facts about jacket and insulation thickness, number of strands, circular mil area, and cable size. Why not write for your copy of the Simplex Diesel Locomotive Cable Catalog #1016 today? We'll be glad to send it, without obligation, of course.

Simplex WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

WESTINGHOUSE AIR BRAKE COMPANY.—*C. D. Stewart*, vice-president of engineering, has been retired but has been retained as an advisor and consultant on special projects. *G. L. Cotter*, as director of engineering, has become chief executive in charge of all engineering activities of the Air Brake division.

C. D. Stewart

Mr. Stewart was born at Apollo, Pa., on April 15, 1888. In 1912, upon receiving the degree of M.E. at the Pennsylvania State College, he became a special apprentice in the employ of the Westinghouse Air Brake Company at Wilmerding, Pa. He was transferred to San Francisco in 1913 as mechanical expert, and in 1917 became district engineer. He was named vice-president, Westinghouse Pacific Coast Brake Company in 1924. He returned to Wilmerding in 1935 as chief engineer of Westinghouse Air Brake and in 1944 was appointed director of engineering. He was elected vice-president in 1945.

G. L. Cotter

Mr. Cotter was born on November 9, 1902, at St. Louis. He was educated at the University of Michigan (B.S. in M.E.) and began his career with Westinghouse Air Brake in 1923 in miscellaneous engineering and general office duties. In 1929 he was appointed central district engineer; in 1941, commercial engineer; in 1943, western district engineer; in 1945, assistant western manager; in 1947, western manager, and on January 1, 1949, director of engineering.

VAPOR HEATING CORPORATION.—The Vapor Heating Corporation and its manufacturing subsidiary, the Roth Manufacturing Company, have announced plans for a $2-million factory and office building to be located in the Chicago suburban community of Niles. Initial plans fall for completion of the structure by January 1954. It will contain about 218,000 sq. ft. of floor space, all but 30,000 sq. ft. of which will be devoted to manufacturing. Of brick, steel and concrete construction, the new plant will cover about 10 acres of a 30-acre site. When completed, all the firm's manufacturing operations — train-heating systems, steam generators, thermostats and electrical controls—will be transferred from the several sites where they are currently conducted. However, the company will retain offices at 80 East Jackson Boulevard in Chicago.

■

AMERICAN LOCOMOTIVE COMPANY.—*Charles F. Venrich* has been appointed manager, Alco-G.E. locomotive sales and field service, with headquarters at Schenectady, N.Y.

Mr. Venrich was born in Crete, Neb. He has been associated with Alco since 1936 when he graduated from Dartmouth College. He started at Schenectady as a special apprectice and served as sales representative, special assistant to the vice-president, and assistant district sales manager in the company's Chicago sales offices. In 1947 he was transferred to San Francisco as district sales manager, and in 1952 returned to Schenectady as assistant to the vice-president and contracting officer, ordnance division.

Charles F. Venrick

■

GRAYBAR ELECTRIC COMPANY.—*J. E. Carroll*, formerly commercial sales manager for the Graybar Electric Company, has been appointed district sales manager, with headquarters at Cincinnati.

■

SCULLIN STEEL COMPANY.—*James E. Nolan* has been elected vice-president and assistant to president of the Scullin Steel Company.

■

INLAND STEEL COMPANY. The Inland Steel Company has created two new departments from its former railroad, pig iron, and chemical division: The railroad division and the pig iron and coal chemical division. *M. S. George*, formerly manager of the New York sales office, has been appointed manager of sales, railroad division, at Chicago. *Harold J. Kreher*, formerly assistant manager of sales in the railroad, pig iron and chemical division, has been appointed manager of sales for the new pig iron and coal chemical division. *Roger S. Bullard*, a sales representative for the former division, has been appointed assistant manager of sales in the pig iron and coal chemical division, and *Harry R. Johnson*, formerly assistant manager of sales, sheet and strip division, has been appointed manager of the New York sales office, to replace Mr. George.

Robert M. Buddington, formerly manager of the Chicago district sales office of Inland, has been appointed assistant general manager of sales, and *Derrick L. Brewster*, formerly assistant manager of sales in the bar and semi-finished division, succeeds Mr. Buddington as manager of the Chicago district office.

■

BARBER-COLMAN COMPANY.—The Barber-Colman Company, Rockford, Ill., has opened a new factory branch office in Columbia, S. C. *Robert Lindsay* has been appointed branch manager.

■

UNION CARBIDE & CARBON CORP.—*Thomas D. Cartledge* has been elected vice-president. Mr. Cartledge has been president of Linde Air Products Company, a division of Union Carbide & Carbon, since May 19, 1952.

Mr. Cartledge was born in Jefferson, Ga., and attended Erskine College. He enlisted in the Navy at the beginning of World War I and was a lieutenant (j.g.) upon leaving the service. He then became a salesman for Linde, assigned to a Cleveland territory. He was appointed district manager in Kansas City and later district manager in Dallas. In 1925 he was transferred to Linde's general sales management staff, serving as manager, gas sales; assistant general sales manager, and general sales manager until 1940 when he was elected vice-president. Four years later he became senior vice-president, director, and a member of the Executive Committee of Linde Air Products.

T. D. Cartledge

■

M & J DIESEL LOCOMOTIVE FILTER CORPORATION.—*L. F. Duffy* has been elected

this is NEWS !!

AIR POWERED

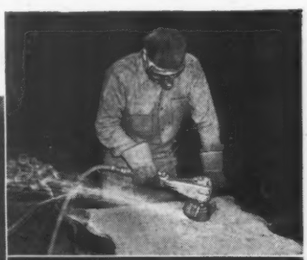
ANGLE GRINDER

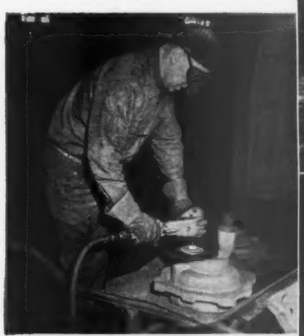
without Gears

Another Ingersoll-Rand First . . . a Direct Drive Angle Grinder

Here's an Angle Grinder that has the inherent qualities of any angle grinder, but features direct drive with no gearing! Its extra power and ease of handling provide fast, efficient and safe operation on practically all surface grinding, cut-off and sanding jobs.

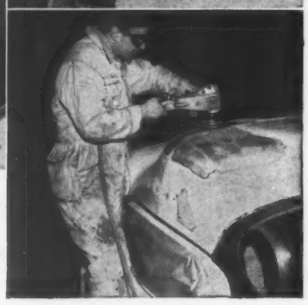
Grinding a casting with the 2FA-60 Angle Grinder. ▶





▲ 2FA-60 Angle Grinder with cut-off wheel nicking risers.

Sanding car hood with 2FA-60 Angle Grinder. ▶



Size 2FA Angle Grinder

Features

- **This advanced grinder design eliminates the need of bevel gears, or gears of any kind.**
- **Two types of dead handles are available - one is straight, the other is 30° off of straight. These handles may be attached to either side of the grinder. The angle dead handle can be rotated to any one of four positions. This means that the tool can easily be adapted for corner grinding or for right or left handed operators.**
- **Built-in lubricator provides ample lubrication for long life.**
- **The motor is muffled to reduce noise.**
- **The exhaust deflector, located on the bottom of the tool, is adjustable to deflect the exhaust away from the operator.**
- **Quick-acting throttle makes this powerful grinder easy to use.**
- **Heavy-duty ball bearing construction throughout.**

Specifications

Speed, at 90 lb. air pressure	*6000 rpm
Length overall	15¼"
Height of angle head, less wheel	7⅛"
Weight, less guard	10 lbs.
Arbor diameter	⅝" - 11 thd.
Flared cup grinding wheel diameter	5"
Sanding pad diameter	7"
Size hose	½"
Hose connection pipe tap	½"

*Size 2FA-80 Angle Grinder, operating at 8000 rpm, is also available for special applications.

Ingersoll-Rand

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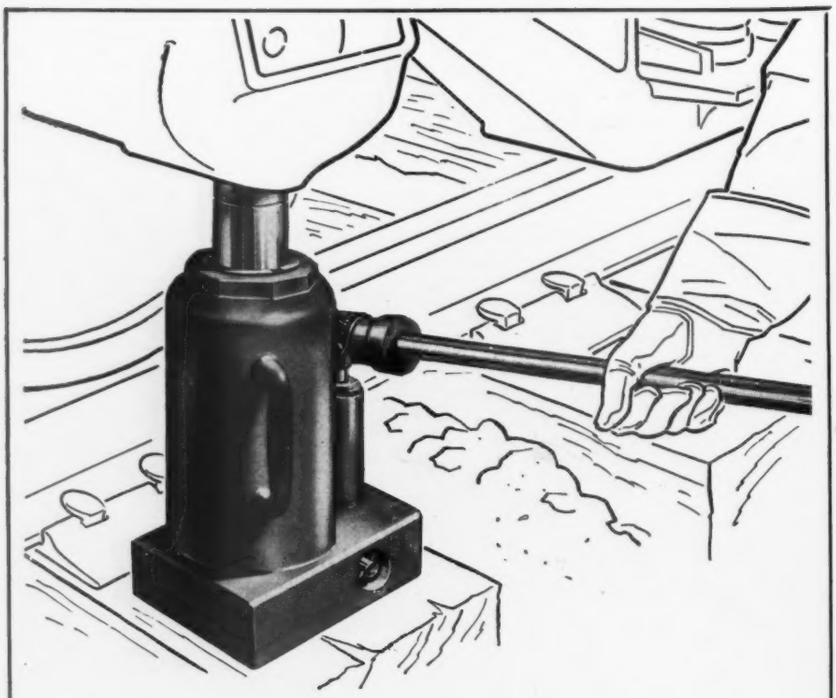


NEW! A 35 Ton Hydraulic Journal Jack

First in the Industry!

You asked for it and here it is—a brand new jack designed and built especially for servicing heavier freight cars. It can raise 35 tons 6 inches—is only 9.7 high—weighs but 55 pounds. With the 35H9.7, the job of inspecting and renewing journal brasses can now be done without the danger of overloading a lower capacity hydraulic journal jack—and the work can be done faster with less effort! If you have the problem of lifting heavy cars, we suggest you get complete details on this new 35 ton hydraulic journal jack immediately. Write the world's oldest and largest manufacturer of lifting jacks for bulletin AD29-G, The Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

DUFF-NORTON

"Giving Industry A Lift Since 1883"

Jacks

president of the M & J Corp., succeeding *Jack P. Morris*, who has resigned. Mr. Duffy will continue also in his previous capacity as chairman of the board. *Robert J. Drewniak* has been elected vice-president, succeeding *R. W. McNeily*, who also has resigned.

■

GENERAL ELECTRIC COMPANY.—*Marvin J. Kolhoff*, who has been appointed manager of the locomotive and car equipment department laboratory as announced in the May issue, became associated with G. E.

Marvin J. Kolhoff

in 1939 on a test engineering program. In 1942 he was appointed requisition engineer in the locomotive and car equipment department. In 1946 he became administrative assistant of the control engineering division, and in 1951 was named assistant engineer of the laboratory.

■

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION.—*D. O. Brooks* has been appointed sales manager of the Jacksonville (Fla.) factory branch of the Electro-Motive Division of General Motors Corporation; not sales manager of E-M.D., as was incorrectly stated in the May issue. *W. N. Fritts* is general sales manager of the division, and *P. R. Turner* is director of sales.

■

GENERAL MOTORS DIESEL, LTD.—*William M. Warner* has been appointed director of sales of the Engine Sales division of General Motors Diesel, Ltd., at London, Ont. He succeeds *Norman H. Daniel*, who has retired.

■

GRIFFIN WHEEL COMPANY.—*James P. Maher* has been elected vice-president of the Griffin Wheel Company at Chicago. He had previously held various positions in the sales department of that company.

Obituaries

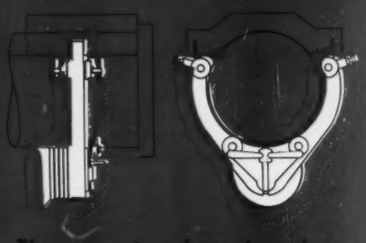
EMMETT A. WILLIAMS, vice-president of the National Bearing Division of American Brake Shoe Company, died on April 14 at St. John's Hospital, St. Louis, Missouri. Mr. Williams had been with National Bearing since 1913. He was made manager of the Meadville, Pa., plant in 1928, when it became a subsidiary of American Brake Shoe Company.

NEW JOURNAL BOX COMBINATION *PREVENTS HOT BOXES*

1. LIDSEAL*

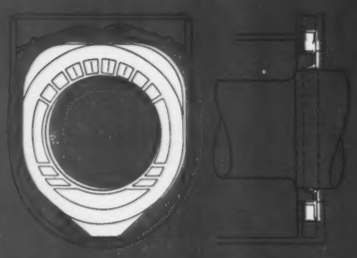
Keeps out road dirt, dust, brine and moisture. Soft, oil-resistant rubber adjusts to rough castings. Fits freight or passenger journal box lids approved by the AAR since 1947. Exclusive breather permits ventilation. Very easy to install.

2. LUBERATOR*



The newest and most modern of all journal lubrication methods—fits any journal box, replaces waste packing. Easy to install—just slip in place—transfers oil from as low as ½ inch above bottom of box to journal surface.

3. SEALOIL*



Dust Guard completely seals rear of any box against road dirt and moisture—adjusts to rough surface of well. Breather vents reduce moisture condensation within box. Resilient, self-lubricating rubber adjusts to all motions of axle.

Three new items by Roth cut lubrication and maintenance costs, keep cars rolling!

Cut lubrication and maintenance costs, prevent damage and delays in service with these three new engineering miracles that simply and effectively solve the railroads' biggest car operating problem—hot boxes. From front to rear of any journal box, old or new, these three new items by Roth provide complete protection against road dirt, dust and moisture condensation . . . the Roth LUBERATOR reduces oil usage, permits less frequent replenishment . . . and the exclusive Roth breathing devices built into the LIDSEAL and the SEALOIL Dust Guard permit entry of the air required for proper ventilation.

Write or Ask for Complete Engineering Data

ROTH RUBBER COMPANY

1854-1866 SOUTH 54th AVENUE • CHICAGO 50, ILLINOIS

Serving the Railroad Industry since 1923

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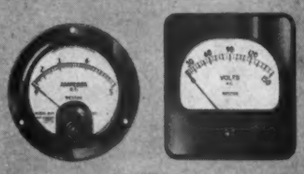
A-C Clamp Volt-Ammeter

(Model 633, Type VA-1) For convenient and rapid measurement of a-c voltage and current without breaking the circuit. Jaws take insulated or non-insulated conductors up to 2" diameter. Safe, rugged, versatile. Also available as a-c clamp ammeter, without voltage ranges.



Panel and Switchboard Instruments

A complete line of instruments in all types, sizes and ranges required for switchboard and panel needs... including d-c, a-c power frequencies and radio frequency, rectifier types and D.B. meters.

Specialized and Multi-purpose

INSTRUMENTS

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For complex, or just routine measurement jobs, these and other specialized WESTON Instruments save time and assure dependable measurements. For information on the complete line, see your local Weston representative, or write . . . WESTON Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

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Model 622
Ultra-Sensitive Instruments

Portable d-c and a-c thermo instruments for precision measurement of potentials and minute currents in electronics or laboratory research.

Model 697 Volt-Ohm-Milliammeter

One of a line of pocket-size meters, Model 697 combines a selection of a-c and d-c current, and resistance ranges. Ideal for maintenance testing and many inspection requirements.

Industrial Circuit Tester—Model 785

A multi-range, multi-purpose, ultra-sensitive analyzer, for laboratory and industrial checking of electrical and electronic circuits. Has 28 practical scale ranges; measures d-c and a-c voltage, d-c and a-c current, and resistance. Accessories available to extend ranges. Compact and portable; furnished in either oak or steel case.

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Portable Test Instruments

Available in d-c, Model 901 and a-c, Model 904, single and multiple ranges of wide coverage. Excellent scale readability and shielding. Accuracy within ½ of 1%.

PERSONAL MENTION

Boston & Maine

CLIFTON A. PLAMONDON, general car foreman at White River Junction, Vt., appointed assistant shop superintendent Concord (N.H.) shop.

JAMES A. HESELTON, supervisor of steam heat and air conditioning at Boston, appointed general car foreman at White River Junction, Vt.

Atchison, Topeka and Santa Fe

H. K. LANNING, engineer of mechanical research at Topeka, Kan., appointed mechanical and research engineer at Topeka.

Born: February 23, 1910, at Topeka.

Education: University of Kansas (E.E.)

Career: Became assistant detector car operator on Santa Fe at Topeka in December 1934; diesel maintainer on November 30, 1937, serving at Chicago, Albuquerque, Kansas City, Mo., and Clovis, N.M. In February 1944 appointed electrical foreman at San Bernardino, Cal.; in May 1946, diesel maintainer at Chicago, and in October 1946, engineer of mechanical research.

H. K. Lanning

J. M. NICHOLSON, mechanical and research engineer at Topeka, Kan., retired on March 1.

Born: February 24, 1888, at Scranton, Kan.

Education: Kansas State College (B.S. in M.E. 1912).

Career: Became computor in test department of Santa Fe in 1912; assistant in that department in 1913, and laboratory foreman in 1916. Later in 1916 appointed fuel supervisor at Ft. Madison, Iowa; in 1921, assistant engineer tests at Topeka; in 1923, fuel conservation engineer; in 1931, master mechanic at Slaton, Tex.; in 1934, master mechanic at Kansas City, Kan.; in 1937, mechanical superintendent at Topeka; in 1941, general mechanical assistant at Chicago; in 1942, assistant to vice-president; on November 15, 1948, di-

(*Continued on p. 135*)

(*Continued from page 132*)

rector, department of research at Chicago, and on August 1, 1950, mechanical and research engineer at Topeka.

Associations: Western Railway Club (president); Railway Fuel and Traveling Engineers' Association (past president, International Railway Fuel Association; past

J. M. Nicholson

president, Traveling Engineers' Association); American Society of Mechanical Engineers (past vice-president, Railroad Division), and Mechanical Division, A.A.R. (chairman 1947-48).

Canadian National

G. R. CHEETHAM, road foreman of engines, Portage-Brandon division, Winnipeg, appointed master-mechanic, Hudson Bay division, with headquarters at The Pas.

Canadian Pacific

W. FREDERICK A. BENGER, assistant chief of motive power and rolling stock, appointed chief of motive power and rolling stock at Montreal.

Born: Port Arthur, Ont., July 29, 1892.

Education: Queen's University (B.S. in M.E. 1913).

Career: Machinist apprentice in Angus shops at Montreal during summer of 1911

F. A. Benger

and at Fort William, Ont., during four months of 1912. Returned to Angus on May 1, 1913, later becoming draftsman in the locomotive drawing office at Montreal. On loan to the Dominion Arsenal & Imperial Munitions Board from August 1914

Pertinent Percentages

IN DIESEL PARTS CLEANING!

Here are some basic facts in connection with that troublesome and normally costly cleaning operation... removing stubborn dirt and carbonized oil from diesel engine parts...

95% OF THE HAND LABOR CAN BE SAVED

When you clean your diesel parts in the Magnus Aja-Dip Cleaning Machine, charged with Magnus Decarbonizing Cleaner, you get work so clean that you'll use a maximum of only 5% of the hand labor you now use with ordinary methods and cleaners.

60% OF THE COST OF CLEANER CAN BE SAVED

Magnus Decarbonizing Cleaner, besides being faster and more effective, also LASTS many times longer than any other comparable cleaner.

50% OF THE CLEANING TIME CAN BE SAVED

With the Magnus Method... here are the time schedules for various diesel engine parts. If you'll compare them with the cleaning time required with your present methods, you'll find that they are 50% less or better.

Heads	2 hours	Blowers	20 minutes
Liners	2½ hours	Valves	50 minutes
Rods	20 minutes	Strainers	10 minutes
Pistons	20 minutes	Misc. Parts	5-12 minutes

75% AND MORE OF THE RAILROAD DIESEL HORSEPOWER IS CLEANED THE MAGNUS WAY

That's how many railroads have mechanized with the Magnus diesel parts cleaning method.

ASK FOR COMPLETE DATA

magnus CLEANERS

Railroad Division

MAGNUS CHEMICAL CO., INC.

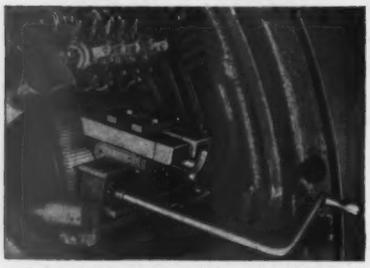
77 South Avenue, Garwood, N. J.

In Canada—Magnus Chemicals, Ltd., Montreal

Representatives in All Principal Cities

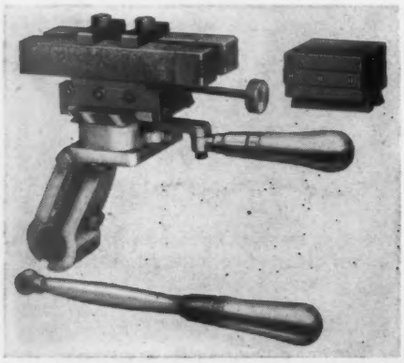
MARTINDALE

DIESEL-ELECTRIC COMMUTATOR MAINTENANCE EQUIPMENT
COMMUTATOR GRINDER



New design makes resurfacing of Diesel-electric commutators more accurate, easier, faster. Carriage is chain-driven, travels on ball-bearings. Adapters for mounting grinder on virtually all models of Diesel generators and motors are also furnished.

TYPE C COMMSTONE HOLDER



Holds Commstones rigid and true for concentric resurfacing of smaller Diesel-electric commutators such as auxiliary generators and amplidyne exciters. Mounts on brush arm by means of an adjustable support.

MICA-MILLER UNDERCUTTER

A powerful, light-weight, low cost, easy to use Undercutter, operating from 1/5 h.p. Universal motor. Available with small, medium or heavy-duty head (interchangeable). Also available with air motor or flexible shaft drive.

See us in Atlantic City
Booth LQ-17. RSMA Convention
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to October 1916. Returned to CPR at Montreal on October 12, 1916, as acting engineer of tests. Appointed chief draftsman and assistant engineer on May 1, 1918; assistant mechanical engineer on February 15, 1923; acting chief mechanical engineer on February 1, 1941; chief mechanical engineer on January 1, 1946, and assistant chief of motive power and rolling stock on January 1, 1948.

L. L. O'BRIEN, division master mechanic at Farnham, Que., transferred to Smith Falls (Ont.) division.

Chicago, Burlington & Quincy

W. C. HORST, general foreman, locomotive repair shops, at West Burlington, Iowa, appointed shop superintendent.

R. C. HIPPE, diesel shop foreman, appointed general foreman at West Burlington, Iowa.

L. R. KLEINKOPF, machine shop foreman at West Burlington, Iowa, appointed diesel shop foreman.

Chicago, Rock Island & Pacific

JOHN D. LOFTIS, assistant superintendent, Chicago division, appointed chief mechanical inspector for the railroad, with headquarters at Chicago.

Denver & Rio Grande Western

A. G. MARTIN, general car foreman at Grand Junction, Colo., appointed general car foreman at Salt Lake City.

D. W. ADAMS, car foreman at Helper, Utah, appointed general car foreman at Grand Junction, Colo.

Elgin, Joliet & Eastern

JOHN J. FERENCIK appointed car foreman at Joliet, Ill.

EDWARD C. RUETTIGER appointed car foreman at Joliet, Ill.

Florida, East Coast

ROBERT B. HUNT, chief mechanical officer, as retired as announced in the April issue.

Robert B. Hunt

Born: Paris, Ky., February 21, 1880.
Education: Kentucky State University (B.M.E. 1901).
Career: Became bridge painter for

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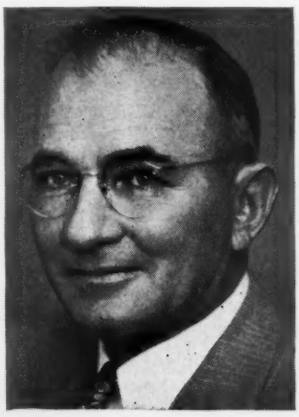
Louisville & Nashville in 1900 and special apprentice on Cincinnati, New Orleans & Texas Pacific (Southern) in 1901. Became draftsman in employ of Florida East Coast in 1902; mechanical engineer in 1909; mechanical engineer, valuation department, in 1915; mechanical engineer at St. Augustine, Fla., in 1917; master mechanic in 1933; acting superintendent motive power and machinery in 1937; superintendent motive power and machinery in 1939, and on July 1, 1946, chief mechanical officer.

GORDIE STEWART, superintendent of diesel maintenance and air brakes, appointed assistant chief mechanical officer at St. Augustine, Fla.

Born: Andalusia, Ala., November 21, 1899.

Career: Began as a telegraph operator for the Louisville & Nashville on October 11, 1917. Subsequently served as locomotive



Gordie Stewart

fireman, engineman, fuel instructor, stationmaster, and traveling engineer. Became locomotive engineer in the employ of the FEC in 1935. Appointed road foreman of engines in 1940; superintendent of air brakes in 1943, and superintendent of diesel maintenance and air brakes in 1952.

New York Central

FRANK K. MITCHELL, manager of equipment, system, appointed assistant vice-president—equipment, with headquarters at New York. Position of manager of equipment discontinued.

Born: November 17, 1894, at Indianapolis, Ind.

Education: Purdue University (B.S. in E.E. 1917; E.E. 1923).

Career: Employed as machinist helper, Millholland Machine Tool Company, Indianapolis June-September 1915; mucker, Calumet & Arizona Mining Company, Bisbee, Ariz., July-September 1916. May 1917 to December 1918 1st lieutenant, U.S. Army, U.S. and France. Became electrician on Cleveland, Cincinnati, Chicago & St. Louis (NYC) on December 18, 1918, and draftsman in May 1919. Appointed service test engineer in July 1922; assistant to superintendent motive power in April 1923; master mechanic in October 1932. From January 1936 to January 1938 master mechanic, Indianapolis Union Railway, and from January 1938 to October 1940, as-

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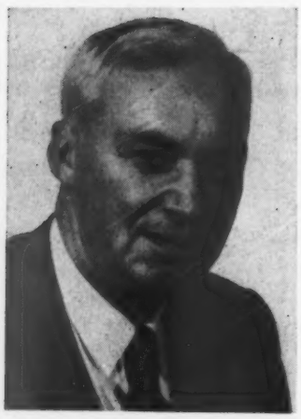

Frank K. Mitchell

sistant superintendent of equipment, Big Four. Appointed assistant to general superintendent motive power, NYC, in October 1940; assistant general superintendent motive power and rolling stock in February 1941; general superintendent motive power and rolling stock in April 1946, and manager of equipment, in January 1949.

E. E. EVERETT, assistant to manager—equipment at New York, appointed to newly created position of assistant to assistant vice-president—equipment. Former position abolished.

MANAGEMENT SERVICES

(Budgets, statistics, planning and analysis, inventory control and industrial engineering studies.)

S. T. KUHN, assistant to general superintendent equipment, appointed to newly created position of chief — management services at New York. Former position abolished.

J. J. WRIGHT, master mechanic of the Boston & Albany at Boston, appointed industrial engineer—equipment at New York. Former position abolished.

C. E. MILLER, superintendent air brakes and steam heat at New York, appointed supervisor inventory control—equipment. Former position abolished.

M. S. RIEGEL, assistant engineer tests at New York, appointed supervisor—personnel—equipment.

M. T. BERNHOFER appointed supervisor budget and statistics—equipment, at New York.

D. R. CRAFT, superintendent personnel—equipment, at New York, appointed assistant supervisor—personnel—equipment. Former position abolished.

LOCOMOTIVE MAINTENANCE

(Engineering; planning for maintenance facilities; coordinating assignment of units for maintenance and shopping; performance standards, including man hours and materials for field operations, supervision over back shops and foundry, technical supervision over district managers—equipment.)

A. L. WRIGHT, superintendent equipment at Cleveland, appointed general manager—locomotive maintenance, with headquarters at New York.

I. W. MARTIN, assistant to general superintendent equipment—locomotives at New York, appointed general superintendent—steam. Former position abolished.

R. J. PARSONS, master mechanic at Albany, appointed assistant to general superintendent — steam maintenance at New York.

F. THOMAS, assistant to general superintendent — diesel and electric at New York, appointed general superintendent—diesel and electric. Former position abolished.

S. D. FOSTER, shop manager at Collinwood, Ohio, appointed assistant to general superintendent—back shops (diesel), with headquarters at New York. Former position abolished.

C. L. HALL appointed assistant to general superintendent—"A" shops, with headquarters at New York.

H. L. MCILVEEN appointed assistant to general superintendent — "B&C" shops, with headquarters at New York.

C. H. KNOWLTON, assistant engineer—equipment at New York, appointed engineer—locomotive engineering services. Former position abolished.

H. H. DUEHNE, general supervisor electric equipment at New York, appointed assistant engineer — locomotive engineering services. Former position abolished.

CAR MAINTENANCE

(Engineering; planning for car maintenance facilities; assignment of cars for shopping; performance standards, including man-hours and materials for field operations; supervision over back shops, and technical supervision over district managers—equipment.)

F. C. RUSKAUP, general superintendent—equipment at New York, appointed general manager—car maintenance. Former position abolished.

G. J. FLANAGAN, assistant superintendent equipment at New York, appointed general superintendent — passenger-car maintenance. Former position abolished.

R. R. SNEDDON, assistant superintendent equipment of the Michigan Central at Detroit, appointed general superintendent — freight-car maintenance, with headquarters at New York.

F. J. KOSSUTH, assistant to general superintendent equipment—car at New York, appointed assistant to general superintendent—shops and projects. Former position abolished.

G. T. WILSON, engineer car equipment at New York, appointed engineer—car engineering services. Former position abolished.

R. H. GRAFF, assistant engineer car equipment at New York, appointed assistant engineer—car engineering services.

ENGINEERING SERVICES

(Research and consulting engineering on new equipment, basic materials, studies on new and long range developments, air brake and steam-heat engineering and maintenance, testing and inspection of materials, supervising locomotive fuel department.)

E. L. JOHNSON, assistant chief engineer equipment at New York, appointed to the

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newly created position of chief—engineering services. Former position abolished.

W. F. COLLINS, engineer tests at New York, appointed assistant chief—engineering services. Former position abolished.

J. A. DUNCAN appointed engineer inspection and tests at New York.

L. D. HAYS, engineer brake equipment at New York, appointed engineer brake equipment.

A. J. SERIENO appointed assistant engineer brake equipment at New York.

EQUIPMENT DEPARTMENT

Lines East

W. C. WARDWELL, superintendent equipment at New York, appointed district manager—equipment.

R. F. BATCHMAN, assistant superintendent equipment at New York, appointed assistant district manager—locomotives. Former position abolished.

C. M. CRAW appointed assistant district manager—car, with headquarters at New York.

Lines West

WILLIAM H. CHIDLEY, assistant superintendent equipment of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, appointed district manager—equipment, with headquarters at Cleveland.

HARRY R. MARTIN, master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis at Beech Grove, Ind., appointed assistant district manager—equipment, with headquarters at Indianapolis.

H. C. MCFARLAND, master mechanic of the Peoria & Eastern at Urbana, Ill., appointed also master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Beech Grove, Ind.

Norfolk & Western

W. R. KINSEY appointed general foreman foundry at Roanoke, Va.

J. L. STONE appointed assistant general foreman foundry at Roanoke, Va.

G. A. BUCK, patternmaker, appointed foreman of the pattern shop at Roanoke, Va.

Missouri Pacific

L. BECKEL appointed master mechanic, St. Louis Terminal division.

Southern

WALTER W. SIMPSON, JR., appointed assistant to superintendent, Hayne car shop, Spartanburg, S.C.

HENRY J. ELROD, assistant foreman car repairs at Spencer, N.C., appointed general foreman car department, Hayne car shop, Spartanburg, S.C.

B. ATTICUS DENNARD appointed roundhouse foreman (day) at Chattanooga, Tenn.

JAMES P. HUTCHISON appointed foreman enginehouse (night) at Monroe, Va.

NOLAN G. FLEMING appointed freight-car repairer supervisor at Charleston, S.C.

MARION J. DAVIS appointed foreman car repairs at Hayne, S. C.

GEORGE A. FLOYD appointed foreman enginehouse at Columbia, S.C.

WILLIAM C. WILLIS, appointed assistant foreman enginehouse at Columbia, S.C.

Texas & Pacific

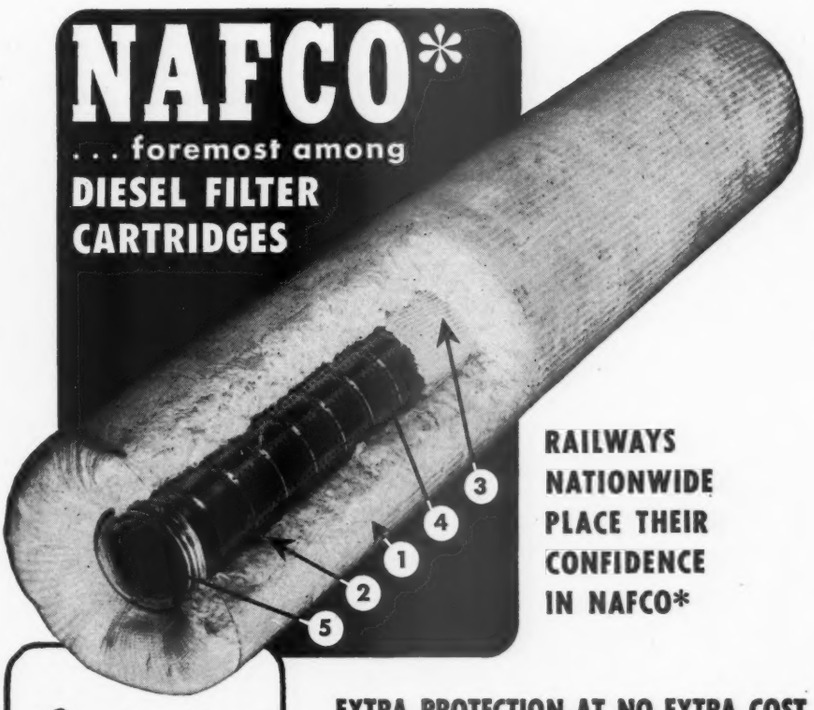
D. H. SMALLRIDGE appointed roundhouse foreman, Wheeling & Lake Erie district, at Mingo Junction, Ohio.

PERSONAL MENTION—*Obituary*

CLAUDE A. PEARMAN, electrical engineer-equipment, Illinois Central at Chicago, died on April 14.

Born: December 17, 1902, at Trezevant, Tenn.

Career: Became electrical helper apprentice, IC, at Carbondale, Ill., in 1922. Served as electrician and relief foreman at St. Louis. Became foreman in 1940; multiple unit foreman, diesel and electrical equipment department at Chicago in 1942, and electrical engineer-equipment in 1947.



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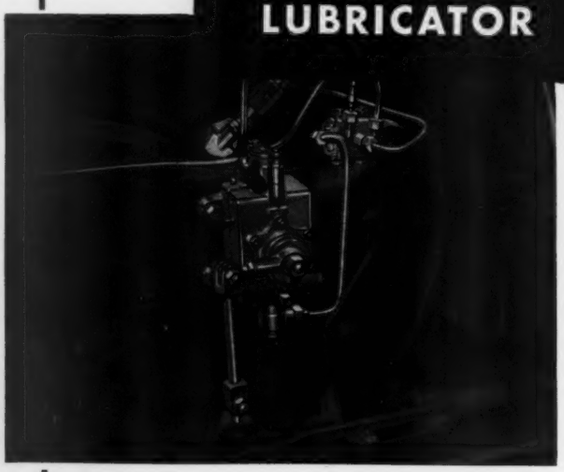

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